

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: Machine Learning Algorithms for Communication

[Programme: B.Tech, ETC]

### **Course Objectives:**

To impart knowledge to student about recent trends in telecommunication. It provides a brief introduction to the new solutions for communication engineering using machine learning techniques.

### SYLLABUS

**Total Lecture Hours: 30** 

MODULE-I:

[10 Hours]

Overview of machine-learning algorithms, their application in wireless communication, supervised learning, unsupervised learning and reinforcement learning (RL), machine learning in wireless channel modeling, (i) propagation scenario classification, (ii) machine-learning-based multipath component (MPC) clustering, (iii) automatic MPC tracking and (iv) deep-learning-based channel modeling.

MODULE-II [10 Hours]

New types of channel estimators based on machine learning, pilot-aided channel estimators, channel estimators based on deep learning and one blind estimator, challenges and open problems for channel estimation aided by machine-learning theories

MODULE-III [10 Hours]

Deep learning is incorporated for indoor localization based on channel state information (CSI) with commodity 5GHz Wi-Fi, deep-learning-based algorithm is to leverage bimodal CSI data, the open Jackson queuing network models, vehicular distribution, Model validation, effective in the analysis of system-level performance and dimensioning for vehicular networks.

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

CO1: Explain the basic principles of machine learning and artificial intelligence.

CO2: Explain the different algorithms involved in machine learning

CO3: use the algorithms for application in communication engineering.

CO4: use deep learning technique for application in communication engineering.

### **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. Machine Learning And Wireless Communications by Ruisi He, ZIghuo Ding.
- 2. Machine Learning, Deep Learning and Computational Intelligence for Wireless Communication by E S
- 3. machine learning and deep learning techniques in wireless and mob by K. Suganthi, R. Karthik, G. Rajesh, Peter Ho Chiung Ching
- 4. 5G Wireless Communication System Using Machine Learning by Dr. S. K. Agrawal

### Other Sources:

### e-Learning Resources:

1. https://www.youtube.com/watch?v=r4sgKrRL2Ys&list=PL1xHD4vteKYVpaIiy295pg6 SY5qznc77

Design and Developed by: Prof. Subrat Kumar Mohanty and Prof. Arpit Sourav Mohapatra

College of Engineering Bhubaneswar

College of Engineering Bhubaness

Dept. of ETC Engg.



## DEPARTMENT OF ELECTRONICS & TELECOMMUNICATION ENGINEERING COLLEGE OF ENGINEERING BHUBANESWAR

Plot No.1 (A), CNI Complex, Patia, Bhubaneswar - 751024, Odisha, India. [AFFILIATED TO BPUT, ODISHA] www.coeb.ac.in

### NOTICE

## ADD-ON/CERTIFICATE COURSE

Ref No: COEB/ETC/2019/09

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 06/08/2019. The interested students to enroll themselves for the course are advised to contact the concerned Course Coordinators for the details.

,001 amator	0 101 0220		Date of
Semester	Course Title	Course Coordinator	Commencement
Semester		Prof. Arpit Sourav Mohapatra	16/08/2019
3rd	PCB Design		15/08/2019
5th	Advances and challenges in telecommunication	Prof . Loknath Sarangi	16/08/2019
7th	Machine Learning Algorithms for Communication	Prof. Sandip Kumar Mishra	16/08/2019
		= 20 ===	

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

Dept. of ETC Engg.

COEB, Bhubaneswar

Date: 05/08/2019

### 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

College of Engineering Bhubaneswar



# COLLEGE OF ENGINEERING BHUBANESWAR (COEB) ADD-ON COURSE

### STUDENT ENROLLMENT SHEET

Name of the Department: Electronics and	Telecommunication Engineering	
Course Title: Machine Learning Algori	ithms for Communication	
Semester: 7th	Academic Year: 2019-20	

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	1601219052	A ASHOK PATRA	A. A. Patr
2	1601219053	AASHISH KUMAR	Harhesh human
3	1601219054	AISHWARYA BEHERA	A. Behera.
4	1601219055	ANKITA KUMARI	Ankita Rumari
5	1601219056	DIVYANSHI LAKRA	Dibyansi Lawa
6	1601219057	PRITIJINTA DAS	1. Das Doll
7	1601219058	RISHIRAJ BIDYABHUSON	Pichireaj Brdyahhuson
8	1601219059	SAMBIT KUMAR MANGARAJ	Sambit human Mangaray
9	1601219060	SHILPA KUMARI	Shilf a Kumi
10	1601219061	SNEHA PRIYANKA TIRKEY	Sneha Priyanka Tirkey
11	1601219124	RAVINDRA KUMAR	Rayindna Verman
12	1601219125	SK MEHBOOB ALI	CK. Mehhooh alli
13	1601219126	TRIPTI JHA	Parph
14	1601219149	ARIJIT MAHANANDIA	Antit Mahanandia.
15	1601219150	MEGHA SHARMA	Migha Sharma
16	1601219160	VISHAL KUMAR	Vishal
17	1601219161	NISHA KUMARI	Nicha lumery
18	1601219162	SHUBHAM ROY	Subham Roy
19	1601219163	SUMEET BHOI	dumof Bhoi
20	1601219164	VIJENDRA BOIPAI	V.130cpa1
21	1601219174	ROSHAN RAJ	Rostan Roy
22	1601219332	BIRESH RANJAN PATRA	Breesh Raujen Pahra
23	1601219333	SMARANIKA MALLICK	Smaranina Mallick





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# DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING ADD ON COURSE\_\_\_\_\_

### STUDENT ATTENDANCE SHEET

Programme: B.Tech in ETC

Semester: 7th Academic Year: 2019-20

Name of the course: Machine Learning Algorithms for Communication

Course Code (if any):

Duration: 30 hours			Date & Signature of the Student				
SL. NO.	Reg. No./ Enrollment No.	NAME OF THE STUDENT	Date: 6 8 14	Date: 19/8/19	Date: 20/8/19	Date: 21 9 19	
1	1601219052	A ASHOK PATRA	A. Honon Paha	A. Akholi Patria	A-Akholi Refina	A. Ashda Padria	
2	1601219053	AASHISH KUMAR	A. Kinor	A. Kum	A.Kum	Avan	
3	1601219054	AISHWARYA BEHERA	A. Rehera	A. Behera	A. Behna	A-Richara	
4	1601219055	ANKITA KUMARI				Mi Ankik kunkai	
5	1601219056	DIVYANSHI LAKRA	Divyamislan	e Divyansi Laktza	Dirransilanna		
6	1601219057	PRITIJINTA DAS	P. Das	Pibas	P. Das.	J. Das.	
. 7	1601219058	RISHIRAJ BIDYABHUSON	Rich ! Bathwar	Rish is Hyabhuson	Kish Bidyalshub	Ristingation	
8	1601219059	SAMBIT KUMAR	Sambit hunan	Sambit human	Samuel human	Sambit human	
		MANGARAJ	manganag	manganaj	mangaraj	margaraj	
9	1601219060	SHILPA KUMARI	Shilpi Kumari	Shilsi flumari	Shilpi Kunani	Shilpi Keman	
10	1601219061	SNEHA PRIYANKA	Sneha Priyento	Sneha Priyanta	Sneha Priyonha	Sucha Prepartia	
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_11	1601219124	RAVINDRA KUMAR	Ravindallan	Ravindra Kamer	Ravindra Kamar	Ravindra Henry	
12	1601219125	SK MEHBOOB ALI	SK Hki	SK Ali	Bri Mi	SKALi	
13	1601219126	TRIPTI JHA	Proipti	Briph	Pripti	Pripti	
_14	1601219149	ARIJIT MAHANANDIA	Aprili Nabonick		Ariji E Mahamande	2.0	
_15	1601219150	MEGHA SHARMA	Magina shama	May ha Shanma	Magha Charuna	Megha Shaenna	
16	1601219160	VISHAL KUMAR	Vishal	Vishal	Vishal	Vishal	
17	1601219161	NISHA KUMARI	Nishelluneri	Nishe Keman	Nichellman	Nighe Stemen"	
18	1601219162	SHUBHAM ROY	Subkam	Subham	Subham.	Subham	
19,	1601219163	SUMEET BHOI	ScomedBhoi	Carneel-Bhoi	Carned Bho?	Seancel Bhoi	
20	1601219164	VIJENDRA BOIPAI	V. Baipai	V. Boinai	V. Boingi	V. Boinai	
21	1601219174	ROSHAN RAJ	Roshankaj	Roshan Ray	Poshan Raj	Roshan Raj	
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DEPARTMENT OF ELECTRONICS	AND TEL	LECOMMUNIC.	ATION	ENGINEER	UNG
ADD ON COURSE					

### STUDENT ATTENDANCE SHEET

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25	of the Course Coor	SMARANIKA MALLICK	S. Mellick	S. h. Mishra	S.Mallocu	S. Mallien



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SL. NO.	Reg. No./ Enrollment No.	NAME OF THE STUDENT	Date: 22 8 10	Date: 25/8/19	Date: 27/8/19	Date: 28 8 19	
1	1601219052	A ASHOK PATRA	A Ashok Vatra	A. Ashok Patra	A. Ashok Patra	A. Ashok Yatig	
2	1601219053	AASHISH KUMAR	A Kun	A. Kun	1 Kim	A Ken	
3	1601219054	AISHWARYA BEHERA	A. Behera	A. Behera	A. Behera	A Believa	
4	1601219055	ANKITA KUMARI	Ankita kum	ri Ankta kumavi	Ankita Kumari	Ankita kuman	
5	1601219056	DIVYANSHI LAKRA		Diyansi Lahra	Divstensi Laura		
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7	1601219058	RISHIRAJ BIDYABHUSON	Righter	Risk Rayablewon	Rish Royabhuson	Ristina Shows	
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10	1601219061	SNEHA PRIYANKA (	Sneha Pri xunka	Sneha Phlyanka	Sneha Priyanha	Sneta Priyanka	
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14	1601219149	ARIJIT MAHANANDIA	r	Arrit Mahandia	Arzattlahande	Arite Mobande	
15	1601219150	MEGHA SHARMA	Magha Shanma	Magha sharina	Megha Channa	Magha Sharma	
16	1601219160	VISHAL KUMAR	Viehal	Vishal	Vashal	Vishal	
17	1601219161	NISHA KUMARI	Ni Shallmani	Nisha, Runari	Nisha Runasi	Nigha Meman	
18	1601219162	SHUBHAM ROY	Subham	Subham	Lubhan	Seubhan	
19	1601219163	SUMEET BHOI	Samuel Bhoi	Secreet Bhoi	Seemeet Bho;	Semeet Bhor'	
20	1601219164	VIJENDRA BOIPAI	V. Boinai	V. Boipai	V-Boinai	V. Boipai	
21	1601219174	ROSHAN RAJ	Roslankay	Rostra Raj	Loshan Raj	Roshan Ray	



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22	1601219332	BIRESH RANJAN PATRA	B. Raman Patr	a B. Ran	an Patria	B. Rayion Patric	a B. Rangian Patica
23	1601219333	SMARANIKA MALLICK	S. Wallicu	C.Ma	lica	S. Mallica.	J
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1	1601219052	A ASHOK PATRA	A. Ashoh Patra	A: Arboh Patna	A. Asholi Postria	A . Asholi Podria	
2	1601219053	AASHISH KUMAR	A Run	D. Kun	A. Kun	A. Kun	
3	1601219054	AISHWARYA BEHERA	A Believa	A. Behera	A. Behera	A. Behera	
4	1601219055	ANKITA KUMARI	Anikita ku	nari Ankita kuma		ri Ankets kumani	
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7	1601219058	RISHIRAJ BIDYABHUSON	Kish i radhwor	Bidyahhuson	Rishigrajabhwon	Rishi Rathway	
8	1601219059	SAMBIT KUMAR		Sampit Numar	Sambot woman.	scan lost hearing	
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_ 9	1601219060	SHILPA KUMARI	Shilpi Cemai	Shilpi Kuman	Ship i Kuney	Shilpi lunar	
10	1601219061	SNEHA PRIYANKA	Sneha Priyanha		Sneha Pri yanla	0 0 0	
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11	1601219124	RAVINDRA KUMAR	Ravindiallum	Ravindra llamar	Ravind va Kumer	Ravindra Kumar	
12	1601219125	SK MEHBOOB ALI	SKAL	SK Ali	SKAL	SKAU	
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_16	1601219160	VISHAL KUMAR	Viehal	Michael	Viehal	Vilhal	
17	1601219161	NISHA KUMARI	Nistallurari	Ni sha Kuman	Nishallman	Nishalluney	
18	1601219162	SHUBHAM ROY	Sibham	Subham	Subham	Lubhan	
19	1601219163	SUMEET BHOI	Semeel Bhoi	Szemeet Bhoi	Sameet Bhoi.	Sumeet Bloi	
20	1601219164	VIJENDRA BOIPAI	V. Boinai		V-Aginai	Visoinai	
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23	1601219333	SMARANIKA MALLICK	S. Halloich	S.M	alli'ch	J		S. Mallion
Signature	e of the Course Coor	dinator	S.W. Mishro	8.K.	Mishra	C. K. P	lishra	Sin. Mishra



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Course Code (if any):

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iL. NO.	Reg. No./ Enrollment No.	NAME OF THE STUDENT 、	Date: 6/9/19	Date: 10 9 19	Date: [] 9 [9	Date:
1	1601219052	A ASHOK PATRA	A. Ashoh Rodna	A. Asholi Portna	4. Ashon Patna	
2	1601219053	AASHISH KUMAR		60 1. Kun	f). Kerr	
3	1601219054	AISHWARYA BEHERA	A-Behera	A Behera	A. Behera	×2
4	1601219055	ANKITA KUMARI	Ankita kumani	Anhita hemani	Annita lucanani	
5	1601219056	DIVYANSHI LAKRA	,,,,,,	Divyansilauga	Divyansi Laura	
6	1601219057	PRITIJINTA DAS	P. Dage	P.Das.	P. Das.	
7	1601219058	RISHIRAJ BIDYABHUSON	Rish is a School		Richina	
8	1601219059	SAMBIT KUMAR		Sannit German	Sambit human	
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9	1601219060	SHILPA KUMARI	Shilpalman	Shilpallman	Shilpa Kumari	
10	1601219061	SNEHA PRIYANKA	Snela Priyanke	Sneha Prizzenka	Sneha Priyunua	
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11	1601219124	RAVINDRA KUMAR	Ravinda Wim	Y Ralindu llamar	Ravindra Ulivar	
12	1601219125	SK MEHBOOB ALI	SKAU	SK. AL	SK. Ali	
13	1601219126	TRIPTI JHA	Proiph	Print	Priph	
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15	1601219150	MEGHA SHARMA	Magha Sharma	Megha Shauma	Magha Sharma	
16	1601219160	VISHAL KUMAR	Vishal	Vilhal	tishal	
17	1601219161	NISHA KUMARI	Nishellman	Nishakuman	Nisha Kunani	Bles
18	1601219162	SHUBHAM ROY	Subhern	Subhern	Subher	
19	1601219163	SUMEET BHOI	Samuel Blo	Seemed Phoi	Samoof Bhoi	
20	1601219164	VIJENDRA BOIPAI	V. Bopai	V. Bapai	r. Bonai	
21	1601219174	ROSHAN RAJ	todan Raj	Rochenkaj	Poslankay	



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# DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING ADD ON COURSE\_\_\_\_\_

### STUDENT ATTENDANCE SHEET

	4.604.240.222	BIRESH RANJAN PATRA	B. Ravian Patra B. Ravian Patra	Bi-Ranjan Palma	
22	1601219332	BIRESH KANJAN PATKA		CALOUNG	
23	1601219333	SMARANIKA MALLICK	S. Mallica	S. May Cu.	-
ignature of the Course Coordinator		S. M. Mishna S. K. Mishra	S.K. Mishna		



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





# Certificate of Completion

has successfully completed the ADD-ON Course titled	of <u>Electronics &amp; Telecommunication Engg.</u> semester <u>Seventh</u> bearing registration number	This is to certify that Mr./MsSHUBHAM ROY
Course titled	tion Engg. semester So	BHAM ROY
Machine Learning Algorithms for Communication	eventh_bearing registration number1601219162	, student of the Department
ication	9162	epartment

TRUE COPY

conducted at College of Engineering Bhubaneswar in the academic year\_

2019-20

A

Course-Coordinator

Principal

PRINCIPAL PRINCIPAL College of Engineering Bhubaneswar



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





# Certificate of Completion

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nas successfully completed the ADD-ON Course titled	Electronics & Teleco	Inls is to certify that Mr./Ms. SUMEET BHO
e ADD-ON Course titled _	mmunication Engg.	SUMEET BHO
	semester	
Machi	Seventh	
Machine Learning Algorithms for Communication	f <u>Electronics &amp; Telecommunication Engg.</u> semester <u>Seventh</u> bearing registration number_	, s:
for Communication	1601219163	student of the Department

TRUE COPY

conducted at College of Engineering Bhubaneswar in the academic year\_

2019-20

Course-Coordinator

Principal



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





# Certificate of Completion

has successfully completed the ADD-ON Course titled	of Electronics & Telecommunication Engg. semester Seventh bearing registration number	This is to certify that Mr./MsVIJENDRA BOIPAI
Machine Learning Algorithms for Communication	ster Seventh_bearing registration number1601219164	$oxed{\mathrm{I}}$ , student of the Department

TRUE COPY

conducted at College of Engineering Bhubaneswar in the academic year\_

2019-20

A

Course-Coordinator

Principal



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





# Certificate of Completion

of Electronics & Telecommunication Engg. semester Seventh bearing registration number 1601219174  has successfully completed the ADD-ON Course titled Machine Learning Algorithms for Communicatio
renth_bearing registration number1601219174 Machine Learning Algorithms for Communication
1 1 97

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conducted at College of Engineering Bhubaneswar in the academic year\_

2019-20

Course-Coordinator

Principal



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





# Certificate of Completion

has successfully completed the ADD-ON Course titledN	of <u>Electronics &amp; Telecommunication Engg.</u> semester <u>Seventh</u> bearing registration number_	Inis is to certify that Mr./Ms. BIRESH RANJAN PATRA
Machine Learning Algorithms for Communication	enth_bearing registration number1601219332	, student of the Department

TRUE COPY

conducted at College of Engineering Bhubaneswar in the academic year\_\_\_

2019-20

Course-Coordina

Course-Coordinator

Principal

PRINCIPAL PRINCIPAL College of Engineering Bhubafter