

Department of Computer Science and Engineering
National Institute of Technology Calicut
NIT Campus (PO), Calicut-673601, India

DCC Meeting Minutes

Date: 11-04-2023

Time: 12:05 PM to 1:00 PM

Venue/Mode: CSED Seminar Hall

Agenda Items:

1. Ratification of the minutes of the DCC meeting held on 22/03/23
2. Action Taken Action Pending Report of the last DCC meeting
3. M Tech CSE (AI & DA) revised proposai
4. PhD / M Tech (Self Sponsored) Test/ Interview Modes
5. Department Duty Allocation
6. Eligibiitiy for PhD in CSED - Do we need a revision?
7. PG Projects - Cap on the number of stndents guided by a faculty

The DCC meeting started at CSED Seminar Hall at 12:05 PM. The Chairperson welcomed all members to the meeting. HOD welcomed Dr Venkitarama Reddy Chintapalli, who joined as assistant professor in the CSE department to his first DCC meeting. Dr Venkitarama Reddy Chintapalli gave a brief introduction of himself to the DCC members.

Agenda Item 1: Ratification of the minutes of the DCC meeting held on 22/03/23

The DCC ratified the confirmation of the minutes of the DCC meeting dated 22/03/23.

Agenda Item 2: Action Taken Action Pending Report.

There are no actions pending and no actions to be taken, as per last DCC meeting.

Ageuda Item 3: M Teeh CSE (Artificial Intellgence & Data Auaiytics) revised proposal

Prof. Abdul Nazeer K A, Program Coordinator presented the revised proposal (Appendix I) for M Tech CSE (AI & DA) programme subsequent to the decision in the 60th meeting of the Hon. Board of Governors to introduce the programme in the self financing scheme.

After a detailed discussion, the DCC members approved the proposal with the following key points.

1. Increase in intake from 15 to 25.
2. Eligibility for the programme: Bachelor's degree of four years duration in any branch of Engineering/Technology OR Master's degree of two/three years duration in any stream of Science / Mathematics / Statistics / Computer Science / Computer Applications, from a recognized

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university/institute, with minimum 60% marks or CGPA of 6 (55% marks or CGPA of 5.5 for SC/ST candidates).

3. Selection Process: Selection will be based on the test and interview conducted by the Department of Computer Science and Engineering.

DCC also observed that the M Tech CSE (AI & DA) was originally proposed as a replacement for the Master of Computer Applications (MCA) programme which was discontinued from the year 2022. Hence, the new M.Tech programme can be run by the department by utilizing the faculty positions allotted for MCA, without any additional cost or financial burden on the MoE (as directed by the Hon. BoG).

The DCC also requested that the existing faculty positions which were actually allotted for the MCA programme may be retained for running the new M.Tech programme, as the new M.Tech programme in CSE (AI & DA) was originally proposed as a replacement for the MCA programme.

Agenda Item 4: PhD / M Tech (Self Sponsored) Test/ Interview Modes

As per the directives from Director, Dean's & HoD's meeting, the HoD placed the matter of "mode of test and interview for PhD and MTech Self sponsored candidates" for discussion and decision by the DCC. After a brief deliberation, the DCC recommended conducting both the Test and Interview in an "Online" mode for PhD and self-sponsored M Tech candidates.

Agenda Item 5: Department Duty Allocation

HoD presented the proposed duty allocation for all the faculty and staff for the academic year 2023-24 and is attached (Appendix II).

Agenda Item 6: Eligibility for PhD in CSED - Do we need a revision?

Dr Amit Praseed, on behalf of the PhD coordination committee, raised the question of whether the current eligibility criteria for PhD needed to be revised. After some discussion, the DCC suggested that the matter be addressed at a separate faculty meeting.

Agenda Item 7: PG Projects - Cap on the number of students guided by a faculty

HoD presented a proposal to rethink the current cap on M.Tech projects to be guided by a department faculty based on the current faculty strength. After a brief discussion, DCC decided that the cap can be decreased to 2, with effect from the 2023 admission batch.

The meeting ended at 01: 00 PM.

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Appendix I

Proposal for

M.Tech. Programme in Computer Science and Engineering

(Artificial Intelligence & Data Analytics)

Submitted by

Department of Computer Science and Engineering

National Institute of Technology Calicut

[Revised Proposal after approval from the Hon. BoG, NIT Calicut, to start the programme in the self-financing mode]

INSTITUTION: **National Institute of Technology Calicut**

DEPARTMENT/SCHOOL: **Computer Science and Engineering**

DEGREE PROGRAM:

M. Tech. in Computer Science and Engineering (Artificial Intelligence & Data Analytics)

PROJECTED DATE OF IMPLEMENTATION: **July 2023**

INTAKE OF STUDENTS : **25**

J. A. B.
19/04/23

1. About of the Program

With the emergence of Artificial Intelligence (AI) back in the limelight, coupled with the availability of huge chunks of data in diverse fields, life is becoming more and more oriented towards Machine Learning (ML) and Data Science (DS). The world is fast moving from IoT (Internet of Things) to IoE (Internet of Everything), with millions of people connected by mobile devices. Availability of unprecedented processing power, storage capacity and access to enormous data opens up boundless possibilities. The 'fourth industrial revolution', characterized by the fusion of technologies that is blurring the boundaries between physical, digital and biological fields, calls for *intelligent* solutions in all spheres of life. In the backdrop of such a scenario, when the world is "*drowning in data, but starving for knowledge*", a harmonious blend of AI and Data Analytics (DA) tends to offer promising computational solutions for problems in diverse fields of activities such as life science, education, health and medical science, climate and environment, web and social media, finance, and agriculture.

The massive data that have been generated out of various scientific experiments using the latest developments necessitated specialized and efficient mathematical and computational models to mine useful knowledge from these 'big data', which is not manually possible. AI and ML techniques facilitate data analysis through automated analytical model building, which is based on the idea that machines should be able to learn and adapt through experience. The recent developments like self-driving cars, satellite imagery analysis to address climate change or identify regions of better agricultural yield, business intelligence, online recommendation systems, fraud detection, sentiment analysis of Twitter data, computer vision using Deep Learning, and similar developments are evidence of the growing demand for experts in this field. AI and DA play a pivotal role in the Health Care sector as well which include biomedical image and data analysis for early and accurate prediction of diseases, enabling precision diagnosis and treatment, rapid detection of future pandemics, computer aided drug discovery, and analysis of pandemic data for efficient management of diseases like COVID-19. With the ever-growing investments in the field of AI, and the emergence of Big Data technologies, there will be high demand for 'AI and Data Analytics' engineers in the coming years as well.

In the present day scenario, most of the IT/ITES industries are using AI/ML techniques for their business. This creates a high demand for qualified undergraduate/postgraduate/Ph. D/post doctoral level trained manpower in AI at various levels of their organizational structure. Various research institutes are also in need of this manpower for their flagship research works.

Only very few top-tier higher educational institutes in India are offering Master's programs in AI and Data Analytics. Definitely these programmes are not sufficient to meet the skill set requirements of various research or governmental organizations in India and Indian IT related Industries. Also the undergraduate students who are really motivated to continue their

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studies/research in these fields are really huge in number and many of them have to drop their dreams due to insufficient availability of such programmes in India. Considering the above facts, the proposed 2 year M. Tech degree programme in CSE with special emphasis to AI and Data Analytics, has great relevance in India especially in a Government funded Institute like NIT Calicut.

This programme is proposed to be offered for graduates from any branch of Engineering and post-graduates from any field of Science, having a special interest in CSE in general and AI & Data Science in particular. In this way, this programme will be a unique learning experience for the students coming from multidisciplinary fields of Engineering, Science and Technology which is deemed as the need of the hour.

Benefits that will be acquired by the students who will pursue the programme:

- a) The proposed program is a two year Master's degree in technology. The program is designed to admit students with backgrounds in multiple disciplines and is designed to be a multidisciplinary programme bringing together ideas from statistical learning theory and computer algorithms to solve problems in big data analytics. [Ref: Eligibility Criteria - Annexure 1]
- b) The programme exposes students to one of the most actively pursued domains in engineering - Artificial Intelligence, Machine Learning and Big Data Analytics, for which there is high industrial demand. [Ref: Scope for Employment - Annexure 2]
- c) The curriculum has been designed in consultation with experts from both the industry and academia. The curriculum, while providing a balanced coverage of the theoretical foundations of the subject, places heavy emphasis on the engineering practice and focuses on rigorous laboratory practice that suits the industrial requirements. The curriculum also provides sufficient flexibility to the student to specialize in diverse directions by choosing elective courses of her/his interest. [Ref: (i) Proposed Curriculum - Annexure 3 (ii) Comments and suggestions from Department Advisory Board Members - Annexure 4].

2. Rationale for the Program

Institutional Rationale (Alignment with Institutional Mission and Vision)

- 1) The programme will contribute graduates with high technical ability and professional conduct who are well-trained engineering graduates who can immediately contribute to the industrial workforce of the nation and to the progress of the society. Hence, the programme is aligned with the vision and mission of the institution. [Ref: Programme Educational Objectives and Programme Outcomes - Annexure 5]

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- 2) The Department of Computer Science and Engineering has adequate faculty expertise with seven faculty members having done their Ph.D work in the areas of data science, machine learning, bioinformatics and computer vision, and several other faculty members who have collaborative work in the field. [Ref: List of Faculty with Ph.Ds in the field of Artificial Intelligence and Data Analytics and their publications - Annexure 6]
- 3) Since the areas of artificial intelligence, machine learning and data analytics are of high industrial and scientific importance, the institute expects that all graduates of the programme will be offered industrial internships or internships at R&D organizations in the second year of their programme, opening up avenues for industrial collaborations and funded research projects. Thus, the programme is expected not only to produce quality graduates meeting the demands of the industry, it is also expected to foster the growth of the institute by contributing to the R&D funding of the institution.
- 4) Aspiring graduates are expected to pursue Ph.D in the field, in India and abroad - including major institutions in India such as Indian Institute of Science, IITs and NITs - all of which admit Ph.D students in the areas of data science, machine learning and artificial intelligence. [Ref 6: Advertisements for people in the area from a first tier institution]

3. Cost and Support for the Program

The honourable Board of Governors, in its resolution approving the proposal, stated as follows (Ref: Minutes of the BoG, BG.60.04):

Considering all merits of the proposal, the Finance Committee recommended the proposal by the Institute for the introduction of a new M.Tech. programme (Artificial Intelligence & Data Analytics) in the Department of Computer Science and Engineering on self-financing mode without any additional post creation or any additional financial burden on the MoE. BoG approved the recommendation of the finance committee in this regard.

The new M.Tech. programme was originally proposed as a replacement for the Master of Computer Applications (MCA) programme which was discontinued from the year 2022, due to various reasons. Hence the new M.Tech programme can be run by the department by utilizing the faculty positions allotted for MCA.

Therefore, the new M.Tech programme will not incur any additional cost or financial burden on the MoE.

*Officer
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4. Similar and Related Programs in other institutions.

SI No.	Name of Institute	Name of Program & Offering Dept.	Eligibility	Curriculum
1	Carnegie Mellon University	Master of Computational Data Science, CS	NA	https://mcds.cs.cmu.edu/learn-us-curriculum
2	IISc Bangalore	MTech (AI), Jointly by Electrical, Electronics and Computer Sciences (EECS) https://eecs.iisc.ac.in/mtechai/	BE/ BTech or equivalent degree (with a GATE paper in CS, EE, EC) Candidates should have done a formal course in Programming in C and C++	https://eecs.iisc.ac.in/wp-content/uploads/2020/10/MTechAICurriculumOctober1st.pdf
3	IISc Bangalore	M.Tech (Computational and Data Sciences) Department of Computational and Data Sciences http://cds.iisc.ac.in/wp-content/uploads/MTech_CDS_Brochure_final.pdf	BE /B Tech/M Sc/MCA/Four year B.S. or equivalent in any discipline of science/engineering (with a valid GATE Score). Strong Mathematical and Programming background is required	http://cds.iisc.ac.in/academics/mtechcds/

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4	IIT Ropar	M.Tech in Artificial Intelligence CSE https://www.iitrpr.ac.in/information-about-mtech-artificial-intelligence	Candidates with BTech/BE/MCA or MSc in the appropriate area with valid GATE Score in Computer Science and Information Technology (CS)	https://www.iitrpr.ac.in/information-about-mtech-artificial-intelligence
5	NIT Trichy	M.Tech in Data Analytics Department of Computer Applications https://www.nitt.edu/home/academics/departments/ca/programmes/mtech/	Not available	https://www.nitt.edu/home/academics/departments/ca/programmes/M.Tech.%20DA%20Syllabus1.pdf
6	IIT Hyderabad	M.Tech (Artificial Intelligence) Dept. of Artificial Intelligence, IIT Hyderabad	B.Tech/B.E/M.Sc/ Equivalent degree in any discipline	https://ai.iith.ac.in/mtech-admissions.html
7	IIT Guwahati	M.Tech in Data Science An interdisciplinary M. Tech. Programme jointly offered by three departments – CSE, EEE and Maths https://www.iitg.ac.in/ds/	Valid GATE score in CS, EC, EE, IN, MA, ST or XE	https://www.iitg.ac.in/ds/#curriculum

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ANNEXURE I

Eligibility Criteria

Bachelor's degree of four years duration in any branch of Engineering/Technology **OR** Master's degree of two/three years duration in any stream of Science / Mathematics / Statistics / Computer Science / Computer Applications, from a recognized university/institute, with minimum 60% marks or CGPA of 6 (55% marks or CGPA of 5.5 for SC/ST candidates).

Selection will be based on the test and interview conducted by the Department of Computer Science and Engineering.

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ANNEXURE 2

Seope for Employment

Employment sectors to which the post graduates in M.Tech-CSE (AI & DA) could look for gainful employment

- a) Research Institutes, Universities, and R&D Labs in India and abroad conducting research in the field.
- b) Industries like Amazon, Google, and Microsoft. Many Start-ups inside India and abroad are recruiting qualified AI/DA graduates/post graduates now-a-days and presently there is a lack of talent pool in this area.
- c) Government of India organizations.

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ANNEXURE 3

Curriculum

(Based on the Senate approved framework and DCC recommendations)

Department of Computer Science and Engineering

National Institute of Technology Calicut

M.Tech. Programme in

Computer Science and Engineering (Artificial Intelligence & Data Analytics)

Semester 1

Course Code	Course Title	Category	Lecture (L)	Tutorial (T)	Practical/Seminar (P/S)	Credits
CS6318E	Topics in Artificial Intelligence	CS-Core	3	0	2	4
CS6191E	Theoretical Foundations of Machine Learning	CS-Core	4	0	0	4
CS6301E	Introduction to Data Analytics	CS-Core	3	0	2	4
	Elective Basket	Institute	2	0	0	2

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	AIDA Soft-Core	PE	4/3	0	0/2	4
	Programme Elective 1 (Optional)	PE/Other Depts	4/3	0	0/2	4/3
Total			15-20	0	4-8	18-22

Semester 2

Course Code	Course Title	Category	Lecture (L)	Tutorial (T)	Practical/Seminar (P/S)	Credits
CS6319E	Machine Learning	CS-Core	4	0	0	4
CS6393E	Machine Learning Laboratory	CS-Core	1	0	6	4
CS6398E	Project I	CS-Core	0	0	4	2
	Programme Elective 2	PE	4/3	0	0/2	4
	Programme Elective 3	PE	4/3	0	0/2	4
	Programme Elective 4 (Optional)	PE/Other Depts	4/3	0	0/2	4/3

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Total		11-17	0	10-16	18-22
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Semester 3

Course Code	Course Title	Category	Lecture (L)	Tutorial (T)	Practical/Seminar (P/S)	Credits
CS6399E	Project II (from Summer Internship)	CS/Industry Internship	0	0	6	3
CS7398E	Project III	CS/Industry with conditions	0	0	30	15
	Programme Elective 1 (Optional)	PE/Other Depts	4/3	0	0/2	4/3
Total Credits						18-22

Semester 4

Course Code	Course Title	Category	Lecture (L)	Tutorial (T)	Practical/Seminar (P/S)	Credits
CS7399E	Project IV	CS/Industry with conditions	0	0	30	15
	Programme Elective 4 (Optional)	PE/Other Depts	4/3	0	0/2	4/3
Total Credits						15-19

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Note:

- (i) The student has to earn a minimum of 75 credits to become eligible for the M.Tech degree.
- (ii) Those aiming for industry internships may complete their course requirements in the first two semesters itself.
- (iii) The student has to earn 38 credits to become eligible for P. G Diploma. It may be done in the first two semesters with an optional Project Phase II in the department itself.
- (iv) For the "AIDA Soft-Core" in Semester I, the student should credit one of the Programme Electives tagged (with an asterisk) as an AIDA Soft-Core. In the current curriculum, the electives CS6305E Neural Networks and Deep Learning, CS6371E Natural Language Processing, and CS631E Data Mining are tagged as "AIDA Soft-Core". The department may choose to tag newly proposed electives as "AIDA Soft-Core", based on their content.
- (v) Students may choose any course of appropriate level offered in the Institute as Programme Electives, with approval from the Programme Coordinator.

List of Elective Courses

Sl. No.	Course Code	Course Title	Credits
1	CS6155E	Topics in Data Analytics	4
2	CS6302E	Information Retrieval	4
3	CS6303E	Statistical Foundations of Data Science	4
4	CS6304E	Advanced Deep Learning and Computer Vision	4
5	CS6305E	Neural Networks and Deep Learning*	4
6	CS6306E	AI in Healthcare	4
7	CS6307E	Computational Linear Algebra	4
8	CS6308E	Computational Optimization Methods	4
9	CS6309E	High Performance Computing for AI	4
10	CS6310E	Intelligent Agents	4
11	CS6311E	Approximation Algorithms	4
12	CS6312E	Speech Information Processing	4
13	CS6313E	Advanced Data Structures and Algorithms	4
14	CS6314E	Internet of Things	4

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15	CS6315E	Data Mining*	4
16	CS6316E	Data Modeling and Visualization	4
17	CS6317E	Term Paper	4
18	CS6171E	Natural Language Processing*	4
19	CS6151E	Software Engineering	4
20	CS6154E	Topics in Database Design	4
21	CS6133E	Game Theory	4
22	CS6173E	Image Processing	4
23	CS6181E	Bioinformatics	4
24	CS6174E	Pattern Recognition	4
25	CS6141E	Distributed Computing	4
26	CS6201E	Cryptography	4
27	CS6112E	Operating System Design	4
28	CS6213E	Foundations of Information Security	4
29	CS6132E	Topics in Algorithms	4
30	CS6122E	Computer Architecture	4
31	CS6283E	Computer Laws and Ethics	4
32	CS6102E	Compiler Design	4
33	CS6135E	Logic for Computer Science	4
34	CS6101E	Mathematical Foundations of Computer Science	4
35	CS6111E	Algorithms and Complexity	4
36	CS6103E	Software Systems Laboratory	4

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ANNEXURE 4

Comments from the members of the Department Advisory Board (DAB) and the Subsequent modifications done in the Proposed Curriculum

Abstract of the Comment	Revisiou iucorporated for compliance
<p>Mr. Jaganmohau Reddy Kancharia, Senior Development Manager, Informatica Business Sointions. Pvt. Ltd, Bangaiore (Eminent Alnmni).</p> <p>The curriculum looks good for me, I wonid also suggest to include the beiw subjects.</p> <p>Advanced Data Structures and Aigorithms understanding of efficient software solutions for various applications areas using appropriately selected data structures and algorithms is also important for AI & DA.</p> <p>Python for Machine Learning: - There are various labs and not sure about the content, hands on programming exposure is also important mainly for the data visualization.</p>	<p>The course</p> <p>CS 6313D Advanced Data Structures and Algorithms</p> <p>has been included as an elective course. This course will fill the required background for students from non-CS backgrounds.</p> <p>Python will be introduced for solving problems in machine learning in the course</p> <p>CS 6393D Machine Learning Laboratory</p>
<p>Dr. Roshy John Robotics and Cognitive Systems Tata Consnitancy Services</p> <p>The curriculum looks good, however, I don't find an application of cryptocourrency as a course for ML. Otherwise, everything seems good to me.</p>	<p>Applications to cryptocurrency will be included in the core course</p> <p>CS 6192D Machine Learning</p>
<p>Mr. Jayafar Moidn, Chief Execentive Officer, JMR Infotech. (Eminent Aiumni) and Mr Mannjith P Sasidharan, Dircctor - Key Acconnts, Financial Services BU, JMR InfoTech (Industry Expert)</p> <p>1. The field of AI/DA cuts across multiple disciplines and talented students from a broad range of disciplines might be interested in getting into a career in data science and AI. Therefore, the eligibility to apply for this programme shall be</p>	<p>Eligibility has been modified as follows:</p> <p>Bachelor's degree of four years duration in any branch of Engineering/Technology OR Master's degree of two years duration in any stream of Science / Mathematics / Statistics / Computer Science / Computer Applications, from a recognized university / institute, with minimum 60% marks or CGPA of 6.5 (55% marks or CGPA</p>

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made open to students from all disciplines of B.Tech. However, adequate evaluations may be carried out by the Institute to ensure quality of intake.

2. The curriculum may be structured to cover the entire breadth of Data Science and AI including **Data Acquisition, Data Mining, Data Visualization, Predictive Analytics, Foundations of AI, Machine Learning techniques, Deep Learning** etc. Students may be allowed to delve into some of the business use cases as well. **A mandatory coverage of Deep Learning may be considered, as Deep Learning is lately occupying a larger space in the AI universe.**
3. The course may also cover the **top AI/ML tools such as Python, R, MATLAB and various other packages/tools built by various organizations**, which have facilitated exponential growth of AI in recent times. We presume that this would be covered under the Artificial Intelligence Lab course mentioned in the proposal.
4. Swarm Intelligence is an area which is re-emerging and finding applications in Stock markets, Sales Forecasting, Optimization etc. It may be offered as an elective subject in the course.
5. If there is provision for M.Tech students to get industry exposure through working with Companies/Start-ups in AI space during the course itself, that would pre-equip them for the job. It could be as part of their project in later semesters or as short-term internship programmes.

of 6 for SC/ST candidates)

AND a valid GATE score in *Computer Science and Information Technology* OR *Electronics and Communication Engineering* OR *Electrical Engineering*.

The following core courses introduce the students to the broad spectrum of topics mentioned with practical components integrated into the course.

CS 6301D Introduction to Data Analytics
CS 6172D Artificial Intelligence

The following elective courses are designed to allow the student to explore these topics further in depth, depending on his/her interest of specialization:

CS 6155D Topics in Data Analytics
CS 6316D Data Modeling and Visualization
CS 6305D Neural Networks and Deep Learning
CS 6304D Advanced Deep Learning and Computer Vision
CS 6315D Data Mining
CS 6393D Machine Learning Laboratory
An elective course
CS 6308D Computational Optimization Methods has been included. The course is designed to cover the topics mentioned.
The existing institute regulations permit such interaction.

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<p>Dr. V. K. Govindan, Retired Professor, CSED, NITCalicut.</p> <p>I have gone through the proposal for the new MTech programme in AI & DA.</p> <p>The proposal is timely, and much relevant for industry and research organizations. There is ample scope for such talented students.</p> <p>The courses suggested are proper for the programme. I have some suggestions:</p> <ol style="list-style-type: none"> 1. The course/ programme content may include thorough emphasis for machine learning, sparse techniques, optimization, neural network/deep learning, etc. 2. Consider/ Discuss change of specialization title to "machine learning and data analytics" or "AI and ML" or "Machine learning and data science". If you have already discussed the title issue thoroughly, you can go ahead as it is. 	<p>The following core courses</p> <p>CS 6192D Machine Learning and CS 6172D Artificial Intelligence</p> <p>and the following elective courses</p> <p>CS 6308D Computational Optimization Methods CS 6305D Neural Networks and Deep learning CS 6304D Advanced Deep Learning and Computer Vision</p> <p>will cover all the topics mentioned.</p> <p>The department discussed the matter thoroughly and decided not to change the proposed title.</p>
<p>Dr. M P Sebastian, Professor, Indian Institute of Management Kozhikode (Academic Expert)</p> <ol style="list-style-type: none"> 1. The MCA program lost its relevance, both academically and industrially. Technically it is a PG program, but the courses are of UG level. It is not adding any value to the CSE department or to NITC. 2. The proposed MTech Program is currently very relevant both academically and industrially, and will add value not only to the CSE department but also to the entire institution. This is one of the most preferred programs in the current context, both nationally and internationally. My best wishes. 	<p>No revisions required as per the suggestions..</p>
<p>Dr. Jasiue Babu, Assistant Professor, IIT Palakkad. (Eminent Ainnni).</p> <p>Such a programme is likely to attract students from non-CS backgrounds, because of better job prospects that it offers them. However,</p> <p>If it is open to students from other backgrounds, they may need to do one or two foundational courses in CS (e.g., Design and Analysis of Algorithms), before earning an</p>	<p>An elective course</p> <p>CS 6313D Advanced Data Structures and Algorithms</p> <p>has been included. Students from non-CS background can credit this course in the first semester itself to meet the prerequisites.</p>

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<p>M.Tech degree in CSE.</p> <p>I assume that the syllabus of the "Mathematical Foundations of Machine Learning" course will address this. This would be important to meet PEO1, PO4 and PO5.</p> <p>It may be good to make it explicit what is the potential pool of candidates expected.</p>	<p>The syllabus of CS 6191D Mathematical Foundations of Machine Learning will be designed to address PEO1, PO4 and PO5.</p> <p>Specified in the revised proposal that graduates in any branch Engineering or post-graduates in any branch of Science with a valid Gate score in Computer Science and Information Technology / Electronics and Communication Engineering / Electrical Engineering are eligible for admission.</p>
<p>Dr. Deepak Rajendraprasad, Assistant Professor and Associate Dean (Academic), IIT Paiakkad. (Academic Expert)</p> <p>I went through the proposal carefully. I think this is a very timely change. I'm confident that the new M.Tech program will help address the demand for AI and DS professionals in the country and abroad. Please consider this email as my approval for the proposal.</p>	<p>No revisions required as per the suggestions.</p>

DRP
 19/04/23

Comments and Suggestions from our distinguished alumni currently doing research in AI and Data Analytics

“Overall, I agree that this area is very topical and it's important to have a Masters level course in AI & Data Science. This will help prepare students well for research as well as industry.”

Sriganesh Srihari Ph.D (NUS)
(Bio-Medical Data Scientist)

Advaucc Qneenslaud Iudustry Research Feilow

OIMR Berghofer Medical Research Institute

Brisbane, Australia

<https://au.linkedin.com/in/sriganeshms>

Founder and CEO

GraphMed Analytics Freelance
Brisbane, Australia

<https://sites.google.com/view/graphmedanalytics/home>

“The future of work and life is going to be dominated by AI Technologies. Artificial Intelligence is already transforming numerous sectors such as Health Care, Finance, and Autonomous Vehicles to name a few. AI has also been shaping all our online experiences such as search, social networking and shopping for more than a decade now. AI is and will continue to be a key differentiator for universities, companies and nations aspiring to be global leaders. However, there is a dearth of professionals who are trained in this field and the current academic programmes in the country are not enough to meet the present and the future demand for AI specialists. Commencing a masters programme focusing on AI and Data Analytics is the most consequential decision that the Department of CSE at NITC can take at the moment, to establish itself as the best place to specialize in AI in the state of Kerala, and to be on par with other prestigious institutes for advanced studies in all of India and abroad.”

Dr. Rose Catherine Kanjirathinkal

Research Scientist

Facebook AI, New York, USA.

<http://in.linkedin.com/in/rosecatherinek>

<https://sites.google.com/site/rosecatherinek>

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ANNEXURE 5

PEOs and POs

1. Programme Educational Objectives (PEOs)

PEO1: The graduates shall have an in-depth knowledge in the fundamentals of Artificial Intelligence and Data Analytics with the ability and confidence to specialize in specific areas of individual interest.

PEO2: The graduates shall have the ability to solve problems and critically analyze solutions in the area of interest in AI and Data Analytics.

PEO3: The graduates shall have the skill set for using knowledge in AI and Data Analytics, for the benefit of society with sound ethical practices and a lifelong interest in contributing to knowledge in the field

2. Programme Outcomes (POs)

PO1: An ability to independently carry out research / investigation and development work to solve practical problems.

PO2: An ability to write and present a substantial technical report/document.

PO3: Students should be able to demonstrate a degree of mastery over the area of Artificial Intelligence and Data Analytics. The mastery should be at a level higher than the requirements in the appropriate bachelor program.

PO4: Students should be able to identify appropriate mathematical, analytical or software tools and use them to solve problems in the area of AI and Data Analytics , by applying appropriate skill sets acquired in the area.

PO5: Students should have the ability to critically analyze solutions, proofs and programs in the field of AI and Data Analytics.

PO6: Students should have the ability to communicate ideas, based on ethical values, and

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remain aware of the social responsibilities in the profession.

ANNEXURE 6
Details of Faculty (related to the proposed program)
and their Publications

Names of Faculty Members

1. Dr. Abdul Nazeer K A
2. Dr. Anu Mary Chacko
3. Dr. Gopakumar G
4. Dr. Jayaraj P B
5. Dr. Jay Prakash
6. Dr. Lijiya A
7. Dr. Pournami P N
8. Dr. Pranesh Das
9. Dr. Saidalavi Kalady
10. Dr. Saleena N (On Leave)

Faculty Publications

Dr. K. A. Abdul Nazeer

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Sl. No	Publicatlon along with DOIs and publication/citatiou details
1	Jeena Kleenankandy, KA Abdul Nazeer, <i>Recognizing semantic relation in sentence pairs using Tree-RNNs and Typed dependencies</i> , 6th IEEE Congress on Information Science and Technology (CiSt), 2021, Pages:372-377 DOI: 10.1109/CiSt49399.2021.9357187.
2	KC Mahija, Stanzin Kadol, KA Abdul Nazeer, <i>Computational Investigation of Arjunarishta Formulation using Module-Network Analysis</i> , Advanced Computing and Communication Technologies for High Performance Applications,(ACCTHPA),2020,DOI:10.1109/ACCTHPA49271.2020.9213228
3	N. Nidheesh, K. A. Abdul Nazeer, P. M. Ameer, <i>A Hierarchical Clustering algorithm based on Silhouette Index for cancer subtype discovery from genomic data</i> , Springer, Cited by I, 30 November 2019, DOI://doi.org/10.1007/s00521-019-04636-5
4	P Shamna, VK Govindan, KA Abdul Nazeer, <i>Content based medical image retrieval using topic and location model</i> , Journal of biomedical informatics, AcademicPress, Volume:9I,Pages:103112,1 March 2019, DOI:https://doi.org/10.1016/j.jbi.2019.103112
5	EK Jasila, N Saleena, KA Abdul Nazeer, <i>Ontology Based Document Clustering-An Efficient Hybrid Approach</i> ,IEEE 9th International Conference on Advanced Computing (IACC),13 December 2019,DOI: 10.1109/IACC48062.2019.8971594
6	R Visakh, KA Abdul Nazcer, <i>Multi-network approach to identify differentially methylated gene communities in cancer</i> , Gene,Elsevier,Cited by I,Volume:697,20 May 2019, DOI:https://doi.org/10.1016/j.gene.2019.02.007
7	<i>Identifying synonyms in bigram phrases using Compositional DSM and Artificial Neural Network</i> ,International Conference on Computing, Power and Communication Technologies (GUCON),27 September 2019, Pages:827-831.

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8	Seelam Lavanya; K. A. Abdul Nazeer, <i>An Improved Computational Linguistic Approach for Fine-Grained Sentiment Analysis of Textual Reviews</i> , International Conference on Computing, Power and Communication Technologies(GUCON) 2018, DOI: 10.1109/GUCON.2018.8675021
9	KA Abdul Nazeer, <i>Part-of-speech Tagging and Named Entity Recognition Using Improved Hidden Markov Model and Bloom Filter</i> , International Conference on Computing, Power and Communication Technologies (GUCON), 2018, DOI: 10.1109/GUCON.2018.8674901
10	P Shamna, VK Govindan, KA Abdul Nazeer, <i>Content-based medical image retrieval by spatial matching of visual words</i> , Journal of King Saud University-Computer and Information Sciences, Elsevier, 11 October 2018, https://doi.org/10.1016/j.jksuci.2018.10.002
11	N Nidheesh, KA Abdul Nazeer, PM Ameer, <i>A hierarchical clustering algorithm based on silhouette index for cancer subtype discovery from omics data</i> , bioRxiv, Cold Spring Harbor Laboratory, Pages:309716, 1 January 2018, https://doi.org/10.1101/309716
12	R Visakh, KA Abdul Nazeer, <i>DEEPAligner: Deep encoding of pathways to align epigenetic signatures</i> , Computational Biology and Chemistry, Elsevier, Volume:72, Pages:87-95, 1 February 2018, https://doi.org/10.1016/j.compbiolchem.2018.01.002
13	Anu Balachandran; K.A. Abdul Nazeer, <i>An Improved Clustering Algorithm Based on k-Means and Artificial Bee Colony Optimization for Datasets that Contain Outliers</i> , International Conference on Computing, Power and Communication Technologies (GUCON), 2018, DOI :10.1109/GUCON.2018.8675121
14	N Nidheesh, KA Abdul Nazeer, PM Ameer, <i>An enhanced deterministic K-Means clustering algorithm for cancer subtype prediction from gene expression data</i> , Computers in Biology and Medicine, Volume 91, Pages 213-221, 2017, DOI: https://doi.org/10.1016/j.compbiomed.2017.10.014

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15	MA Anitha, KA Abdul Nazeer, <i>Improved Parallel Clustering with Optimal Initial Centroids</i> , International Conference on Recent Advances in Electronics and Communication Technology (ICRAECT), Pages:114-120, 10.1109/ICRAECT.2017.64
16	R. Visakh, KA Abdul Nazeer, <i>Identifying epigenetically dysregulated pathways from pathway-pathway interaction networks</i> , Computers in biology and medicine, Pergamon, Volume:76, Pages:160-167, https://doi.org/10.1016/j.compbiomed.2016.06.030
17	E. P. Sithara, K. A. Abdul Nazeer, <i>A Hybrid K Harmonic Means with ABC Clustering Algorithm using an Optimal K value for High Performance Clustering</i> , International Journal on Cybernetics & Informatics, Volume:5, Issue:2

Ann Mary Chacko

Si. No	Publication along with DOIs and publication/citation details
1	Sreenivasan M., Anu Mary Chacko, <i>Interoperability issues in EHR systems: Research directions</i> , Data Analytics in Biomedical Engineering and Healthcare, Academic Press, Pages 13-28, Year 2021 https://doi.org/10.1016/B978-0-12-819314-3.00002-1
2	Ajay Chaudhary, Merlin George, Anu Mary Chacko, <i>Extractive Summarization of EHR Notes</i> , Proceedings of the International Conference on Paradigms of Computing, Communication and Data Sciences: PCCDS 2020, Springer Singapore, Pages:909-919, 2021
3	M. A. Sahla Habeeba, A. Lijiya, Anu Mary Chacko, <i>Detection of Deepfakes Using Visual Artifacts and Neural Network Classifier</i> , Innovations in Electrical and Electronic Engineering, Springer Singapore, Pages:411-422, DOI: https://doi.org/10.1007/978-981-15-4692-1_31

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4	M. Sreenivasan, Anu Mary Chacko, <i>A Case for Semantic Annotation Of EHR</i> , IEEE 44th Annual Computers, Software, and Applications Conference (COMPSAC), Pages:1363-1367, 2020, DOI: 10.1109/COMPSAC48688.2020.00-66
5	Vimala Mathew, Tom Toby, Anu Chacko, A. Udhayakumar, <i>Person re-identification through face detection from videos using Deep Learning</i> , IEEE International Conference on Advanced Networks and Telecommunications Systems (ANTS), Pages:1-5, 16 December 2019, DOI: 10.1109/ANTS47819.2019.9117938
6	Merlin George, Anu Mary Chacko, Sudeep Koshy Kurien, Naseer Ali, <i>Diabetes care in cloud-research challenges</i> , Proceedings of the 34th ACM/SIGAPP Symposium on Applied Computing, Pages:160-162, 8 April 2019, DOI : https://doi.org/10.1145/3297280.3297537
7	Merlin George, Anu Chacko, Sudeep Koshy Kurien, <i>Proactive diabetes management: research directions</i> , Proceedings of the 20th International Conference on Distributed Computing and Networking, Pages:486-491, 4 January 2019, DOI : https://doi.org/10.1145/3288599.3297119
8	Vimala Mathew, Tom Toby, Anu Chacko, A. Udhayakumar, <i>Person re-identification through face detection from videos using Deep Learning</i> , IEEE International Conference on Advanced Networks and Telecommunications Systems (ANTS), Pages:1-5, 16 December 2019, DOI:10.1109/ANTS47819.2019.9117938
9	Vimala Mathew, Anu Mary Chacko, A. Udhayakumar, <i>Prediction of suitable human resource for replacement in skilled job positions using Supervised Machine Learning</i> , 8th International Symposium on Embedded Computing and System Design (ISED), Pages:37-41, 13 December 2018, DOI: 10.1109/ISED.2018.8704120
10	Raima Zachariah, K. Akash, Mohammed Sajmal Yousef, Anu Mary Chacko, <i>Adult Swine: A case study</i> , International Conference on Advances in Computing, Communications and Informatics (ICACCI), Pages:1345-1349, 19 September 2018, DOI: 10.1109/ICACCI.2018.8554732

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11	Anu Mary Chacko, Jayendra Sreekar Medicherla, S. D. Madhu Kumar, <i>Anomaly Detection in MapReduce Using Transformation Provenance</i> , Advances in Big Data and Cloud Computing, Pages:91-99, Springer Singapore, 2018, DOI: https://doi.org/10.1007/978-981-10-7200-0_8
12	Raima Zachariah, K. Akash, Mohammed Sajmal Yousef, Anu Mary Chacko, <i>Android malware detection a survey</i> , IEEE international conference on circuits and systems (ICCS), Pages:238-244, 20 December 2017, DOI: 10.1109/ICCS1.2017.8325997
13	Anu Mary Chacko, Anish Gupta, S. Madhu, S. D. Madhu Kumar, <i>Improving execution speed of incremental runs of MapReduce using provenance</i> , International Journal of Big Data Intelligence, Volume:4, Issue:3, Pages:186-194, Inderscience Publishers(IEL), https://doi.org/10.1504/IJBDI.2017.085521
14	Anu Chacko, S. D. Madhu Kumar, <i>Big data provenance research directions</i> , TENCON 2017-2017 IEEE Region 10 Conference, Pages:651-656, 5 November 2017, DOI: 10.1109/TENCON.2017.8227942
15	Jainee Vora, Anu Mary Chacko, <i>Sentiment analysis of tweets to identify the correlated factors that influence an issue of interest</i> , 2nd International Conference on Telecommunication and Networks (TEL-NET), Pages:1-6, 10 August 2017, DOI: 10.1109/TEL-NET.2017.8343572
16	Pratik Ghanwat, Anu Chacko, <i>Improved personalized recommendation system with better user experience</i> , International Conference on Advances in Computing, Communications and Informatics (ICACCI), Pages:1216-1221, 13 September 2017, DOI: 10.1109/ICACCI.2017.8126008
17	Anu Mary Chacko, Alfredo Cuzzocrea, S. D. Madhu Kumar, <i>Automatic Big Data Provenance Capture at Middleware Level in Advanced Big Data Frameworks</i> ,

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	Connected Environments for the Internet of Things, Pages:219-239, Springer, Cham, 2017, DOI: https://doi.org/10.1007/978-3-319-70102-8_11
18	Anu Mary Chacko, Munavar Fairouz, S. D. Madhu Kumar, <i>Provenance-aware NoSQL databases</i> , International Symposium on Security in Computing and Communication, Springer Singapore, Pages:152-160, 21 September 2016, DOI: https://doi.org/10.1007/978-981-10-2738-3_13

Dr. Gopakumar G.

Sl. No	Publication along with DOIs and publication/citation details
1	K. Athira, G. Gopakumar, <i>An integrated method for identifying essential proteins from multiplex network model of protein-protein interactions</i> , Journal of Bioinformatics and Computational Biology, Volume:18, Issue:04, Pages:2050020, World Scientific Publishing Company, 13 August 2020, DOI: https://doi.org/10.1142/S0219720020500201
2	Sunil Kumar, Adheeba Thahsin, M Manju, G. Gopakumar, <i>A Heterogeneous Information Network Model for Long Non-Coding RNA Function Prediction</i> , IEEE/ACM Transactions on Computational Biology and Bioinformatics, 8 June 2020, DOI: 10.1109/TCBB.2020.3000518
3	P. V. Sunil Kumar, G. Gopakumar, <i>Inferring disease and pathway associations of long non-coding RNAs using heterogeneous information network model</i> , Journal of bioinformatics and computational biology, Volume:17, Issue:04, Pages:1950020, World Scientific Publishing Company, 29 August 2019, DOI: https://doi.org/10.1142/S0219720019500203

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4	C. M. Sreeshma, Madhavan Manu, G. GopaKumar, <i>Identification of long non-coding RNA from inherent features using machine learning techniques</i> , International Conference on Bioinformatics and Systems Biology (BSB), Pages:97-102, 26 October 2018, DOI: 10.1109/BSB.2018.8770699
5	P. V. Sunil Kumar, G. Gopakumar, <i>Relrank: An Algorithm for Relevance-Based Ranking of Meta-Paths in a Heterogeneous Information Network</i> , IEEE Recent Advances in Intelligent Computational Systems (RAICS), 98-102, 6 December 2018, DOI: 10.1109/RAICS.2018.8635053
6	P. V. Sunil Kumar, M. Manju, G. Gopakumar, <i>Function prediction of cancer-related LncRNAs using heterogeneous information network model</i> , International Journal of Data Mining and Bioinformatics, Volume:21, Issue:4,Pages:315-338, Inderscience Publishers (IEL), 2018, DOI:https://doi.org/10.1504/IJDMB.2018.098940
7	C. M. Sreeshma, Madhavan Manu, G. GopaKumar, <i>Identification of Long Non-coding RNA from inherent features using Machine Learning Techniques</i> , International Conference on Bioinformatics and Systems Biology (BSB), 2018, DOI: 10.1109/BSB.2018.8770699
8	P. B. Jayaraj, Mathias K. Ajay, M. Nufail, G. Gopakumar, U. C. Abdul Jaleel, <i>GPURFSCREEN: a GPU based virtual screening tool using random forest classifier</i> , Journal of cheminformatics, Volume:8, Issue:1, Pages:1-10, Publisher:BioMed Central, Cited by 11, December 2016, DOI:https://doi.org/10.1186/s13321-016-0124-8
9	PB Jayaraj, K Rahamathulla, G Gopakumar, <i>A GPU based maximum common subgraph algorithm for drug discovery applications</i> , IEEE International Parallel and Distributed Processing Symposium Workshops (IPDPSW), Pages:580-588, Publisher:IEEE, Cited by 2, 23 May 2016, DOI: 10.1109/IPDPSW.2016.65

Dr. Jay Prakash

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Sl. No	Publication along with DOIs and publication/citation details
1	Jay Prakash, Pramod Kumar Singh, <i>Gravitational search algorithm and K-means for simultaneous feature selection and data clustering: a multi-objective approach</i> , Journal:Soft Computing, Volume:23, Issue:6, Pages:2083-2100, Publisher:Springer Berlin Heidelberg, Cited by 11, March 2019, DOI: https://doi.org/10.1007/s00500-017-2923-x0
2	J Prakash, PK Singh, <i>Hybrid Gbest-guided Artificial Bee Colony for hard partitional clustering</i> , International Journal of System Assurance Engineering and Management, Pages:1-18, Publisher:Springer India, Cited by 2, 2017, DOI: https://doi.org/10.1007/s13198-017-0684-7
3	Avadh Kishor, Pramod Kumar Singh, Jay Prakash, <i>NSABC: Non-dominated sorting based multi-objective artificial bee colony algorithm and its application in data clustering</i> , Journal:Neurocomputing, Volume:216, Pages:514-533, Publisher:Elsevier, Cited by 46, 5 December 2016, DOI: https://doi.org/10.1016/j.neucom.2016.08.003

Dr. Jayaraj P. B.

Sl. No	Publication along with DOIs and publication/citation details
1	P.B. Jayaraj, K.M. Mithun, G. Gopakumar, U.C.A. Jaleel; "A GPU based virtual screening tool using SOM." International Journal of Computational Biology and Drug Design 14.1 (2021): 64-80. Publisher: Inderscience, DOI: https://doi.org/10.1504/IJCBDD.2021.114098
2	Seenia Francis, Darshana Suresh, Shalini Nath, Saai Lakshmi D R, Jayaraj P B, Niyas Puzhakkal, and Pournami P N. " Monte Carlo Simulation of Linear Accelerator for Dosimetry Analysis ", IEEE Sponsored 6th International Conference for Convergence in Technology (I2CT) 2021". IEEE Bombay section, Pune, April 2021 (In Press)

J.P.B.
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3	V. A. Jisna, AKil P, J Vinod Kumar Reddy, Pournami P. N. and P. B. Jayaraj, Towards Protein Tertiary Structure Prediction using LSTM/BLSTM, Fourth International Conference on Computing and Network Communications, CoCoNet 2020, Chennai, India, Oct 14-17 2020. [In Press]
4	Kumar Avinash, MB Bijoy, PB Jayaraj, <i>Early Detection of Breast Cancer Using Support Vector Machine With Sequential Minimal Optimization</i> , Book:Advanced Computing and Intelligent Engineering, Pages:13-24, Publisher:Springer, Singapore, 2020, DOI: https://doi.org/10.1007/978-981-15-1081-6_2
5	PB Jayaraj, Samyak Jain, <i>Ligand based virtual screening using SVM on GPU</i> , Journal:Computational biology and chemistry, Volume:83, Pages:107143, Publisher:Elsevier, Cited by 3, 1 December 2019, DOI: https://doi.org/10.1016/j.compbiolchem.2019.107143
6	Sharon Sunny, Deepesh Kataria, PB Jayaraj, <i>An Improved Protein-Protein Docking Technique Using Multilevel Scoring Function</i> , Conference:TENCON 2019-2019 IEEE Region 10 Conference (TENCON), Pages:751-756, Publisher:IEEE, Cited by 0, 17 October 2019, DOI: 10.1109/TENCON.2019.8929261
7	MB Bijoy, A Ansal Muhammed, PB Jayaraj, <i>Segmentation Based Preprocessing Techniques for Predicting the Cervix Type Using Neural Networks</i> , Conference:International Conference On Computational Vision and Bio Inspired Computing, Pages:717-726, Publisher:Springer, Cham, Cited by 0, 25 September 2019, DOI: https://doi.org/10.1007/978-3-030-37218-7_81
8	RS Reshma Raj, C Gayathri, Saidalavi Kalady, PB Jayaraj, <i>Odd-even based adaptive two-way routing in mesh NoCs for hotspot mitigation</i> , Book:Proceedings of the 20th International Conference on Distributed Computing and Networking, Pages:248-252, 4 January 2019, DOI: https://doi.org/10.1145/3288599.3288611

S. J. Jayaraj
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9	Jisna Antony, Vishnu Sreenivas, PB Jayaraj, <i>Towards Building a Coordinate Clustered Library for Template-Based Modeling of Protein Structures</i> , Conference:2018 IEEE Recent Advances in Intelligent Computational Systems (RAICS), Pages:219-223, Publisher:IEEE, Cited by:0, 6 December 2018, DOI: 10.1109/RAICS.2018.8635068
10	MB Bijoy, Vaibhav Shilimkar, PB Jayaraj, <i>Detecting Cervix Type Using Deep Learning and GPU</i> , Conference:2018 IEEE Region 10 Humanitarian Technology Conference (R10-HTC), Pages:1-6, Publisher:IEEE, Cited by:0, 6 December 2018, DOI: 10.1109/R10-HTC.2018.8629824
11	PB Jayaraj, Mathias K Ajay, M Nufail, G Gopakumar, UC Abdul Jaleel, <i>GPURFSCREEN: a GPU based virtual screening tool using random forest classifier</i> , Journal:Journal of cheminformatics, Volume:8, Issue:1, Pages:1-10, Publisher:BioMed Central, Cited by 12, December 2016, DOI:https://doi.org/10.1186/s13321-016-0124-8
12	PB Jayaraj, K Rahamathulla, G Gopakumar, <i>A GPU based maximum common subgraph algorithm for drug discovery applications</i> , Conference:2016 IEEE International Parallel and Distributed Processing Symposium Workshops (IPDPSW), Pages:580-588, Publisher:IEEE, Cited by 3, 23 May 2016, DOI: 10.1109/IPDPSW.2016.65

Dr. Lijiya A.

Sl. No	Publication along with DOIs and publication/citation details
1	KC Shahira, A Lijiya, <i>Towards Assisting the Visually Impaired: A Review on Techniques for Decoding the Visual Data from Chart Images</i> , Source:IEEE Access, Publisher:IEEE, Cited by 0, 29 March 2021, DOI: 10.1109/ACCESS.2021.3069205
2	MA Sahla Habeeba, A Lijiya, Anu Mary Chacko, <i>Detection of Deepfakes Using Visual Artifacts and Neural Network Classifier</i> , Book:Innovations in Electrical and Electronic Engineering, Pages:411-422, Publisher:Springer, Singapore, Cited by:0, 2020, DOI:https://doi.org/10.1007/978-981-15-4692-1_31

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3	Lijiya A and Sudheer AP Shah Rutvik Vrajesh, Amudhan. AN, <i>Shuttlecock Detection and Fall Point Prediction using Neural Networks</i> , International Conference for Emerging Technology (INCET), Belgaum, India, 2020, Pages:1-6, Cited by 0, 2020, DOI: 10.1109/INCET49848.2020.9154136
4	PK Athira, CJ Sruthi, A Lijiya, <i>A Signer Independent Sign Language Recognition with Co-articulation Elimination from Live Videos: An Indian Scenario</i> , Journal:Journal of King Saud University-Computer and Information Sciences, Publisher:Elsevier, Cited by 10, 7 May 2019, DOI:https://doi.org/10.1016/j.jksuci.2019.05.002
5	CJ Sruthi, A Lijiya, <i>Signet: A Deep Learning based Indian Sign Language Recognition System</i> , Conference:2019 International Conference on Communication and Signal Processing (ICCSP), Pages:0596-0600, Publisher:IEEE, Cited by 7, 4 April 2019, DOI: 10.1109/ICCSP.2019.8698006
6	KC Shahira, Sagar Tripathy, A Lijiya, <i>Obstacle Detection, Depth Estimation And Warning System For Visually Impaired People</i> , TENCON 2019-2019 IEEE Region 10 Conference (TENCON), Pages:863-868, Publisher:IEEE, Cited by 2, 17 October 2019, DOI: 10.1109/TENCON.2019.8929334
7	S Sreena, A Lijiya, <i>Skin Lesion Analysis Towards Melanoma Detection</i> , 2nd International Conference on Intelligent Computing, Instrumentation and Control Technologies (ICICICT), Volume:1, Pages:32-36, Publisher:IEEE, Cited by 2, 5 July 2019, DOI: 10.1109/ICICICT46008.2019.8993219
8	A Lubna, Saidalavi Kalady, A Lijiya, <i>MoBVQA: A Modality based Medical Image Visual Question Answering System</i> , TENCON 2019-2019 IEEE Region 10 Conference (TENCON), Pages:727-732, Publisher:IEEE, Cited by 1, 17 October 2019, DOI: 10.1109/TENCON.2019.8929456

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9	KC Shahira, A Lijiya, <i>Document Image Classification: Towards Assisting Visually Impaired</i> , TENCON 2019-2019 IEEE Region 10 Conference (TENCON), Pages:852-857, Publisher:IEEE, Cited by 1, 17 October 2019, DOI: 10.1109/TENCON.2019.8929594
10	S Mumthas, A Lijiya, <i>Transform domain video steganography using RSA, random DNA encryption and Huffman encoding</i> , Journal:Procedia computer science, Volume:115, Pages:660-666, Publisher:Elsevier, Cited by 13, 1 January 2017, DOI:https://doi.org/10.1016/j.procs.2017.09.152
11	R Vinith, K Sarthaj, A Lijiya, VK Govindan, <i>A new feature extraction method for identification of affected regions and diagnosis of cognitive disorders</i> , International Conference on Advances in Computing, Communications and Informatics (ICACCI), Pages:1329-1334, Publisher:IEEE, Cited by 0, 21 September 2016, DOI: 10.1109/ICACCI.2016.7732232

Dr. Pournami P. N

Sl. No	Publication along with DOIs and publication/citation details
1	PN Maddaiah, PN Pournami, <i>Image Registration Using Single Swarm PSO with Refined Search Space Exploration</i> , International Conference on Pattern Recognition and Machine Intelligence, Pages:337-346, Publisher:Springer, Cham, Cited by 0, 17 December 2019, DOI:https://doi.org/10.1007/978-3-030-34869-4_37
2	MR Dileep, PN Pournami, <i>Ayurleaf: A deep learning approach for classification of medicinal plants</i> , TENCON 2019-2019 IEEE Region 10 Conference (TENCON), Pages:321-325, Publisher:IEEE, Cited by 2, 17 October 2019, DOI: 10.1109/TENCON.2019.8929394

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3	PN Maddaiah, PN Pournami, <i>Image Registration Using Single Swarm PSO with Refined Search Space Exploration</i> , International Conference on Pattern Recognition and Machine Intelligence, Pages:337-346, Publisher:Springer, Cham,17 December 2019, DOI: https://doi.org/10.1007/978-3-030-34869-4_37
4	PN Pournami, VK Govindan, <i>Highly Repeatable Feature Point Detection in Images Using Laplacian Graph Centrality</i> , International Conference on ISMAC in Computational Vision and Bio-Engineering, Pages:687-697, Publisher:Springer, Cham, 16 May 2018, DOI: https://doi.org/10.1007/978-3-030-00665-5_68
5	Saheeka Societydorage, PN Pournami, <i>Bi-Histogram Equalization with Adaptive Multi-Plateau Limits for Enhancing Magnetic Resonance Images</i> , 2018 International Conference on Advances in Computing, Communications and Informatics (ICACCI), Pages:1027-1032, Publisher:IEEE, Cited by 1, 19 September 2018, DOI:10.1109/ICACCI.2018.8554859
6	KM Subhasli, PN Pournami, Paul K Joseph, <i>Characterizing EMG signals using aggregated CENSUS transform</i> , 2018 11th Biomedical Engineering International Conference (BMEiCON), Pages:1-4, Publisher:IEEE, Cited by 1, 21 November 2018, DOI:10.1109/BMEiCON.2018.8609929
7	Savinu T Vijay, PN Pournami, <i>Feature Based Image Registration using Heuristic Nearest Neighbour Search</i> , 22nd International Computer Science and Engineering Conference (ICSEC), Pages:1-3, Publisher:IEEE, Cited by 1, 21 November 2018, DOI:10.1109/ICSEC.2018.8712669

Dr. Prauesh Das

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1	R Saha, S Biswas, S Sarmah, P Das, S Karmakar, <i>Design and implementation of routing algorithm to enhance network lifetime in wban</i> , Journal:Wireless Personal Communications, Springer, Publisher:Springer, Cited by 1, 2020, DOI: https://doi.org/10.1007/s11277-020-08054-y
2	R Saha, S Biswas, S Sarmah, P Das, S Karmakar, <i>A working prototype using DS18B20 temperature sensor and Arduino for health monitoring</i> , Journal:SN Computer Science, Springer, Publisher:Springer, Cited by 1, 2020, DOI: https://doi.org/10.1007/s42979-020-00434-2
3	Pranesh Das, Dushmanta Kumar Das, Shouvik Dey, <i>A modified Bee Colony Optimization (MBCO) and its hybridization with k-means for an application to data clustering</i> , Journal:Applied Soft Computing, Volume:70, Pages:590-603, Publisher:Elsevier, Cited by 21, 1 September 2018, DOI: https://doi.org/10.1016/j.asoc.2018.05.045
4	Pranesh Das, Dushmanta Kumar Das, Shouvik Dey, <i>A new class topper optimization algorithm with an application to data clustering</i> , Journal:IEEE Transactions on Emerging Topics in Computing, Volume:8, Issue:4, Pages:948-959, Publisher:IEEE, Cited by 20, 6 March 2018, DOI: 10.1109/TETC.2018.2812927
5	Pranesh Das, Dushmanta Kumar Das, Shouvik Dey, <i>A Multi-objective Modified Particle Swarm Optimization (MMPSO) technique with an application to data clustering</i> , Conference:2017 14th IEEE India Council International Conference (INDICON), Pages:1-6, Publisher:IEEE, 15 December 2017, DOI: 10.1109/INDICON.2017.8487933
6	Pranesh Das, Dushmanta Kumar Das, Shouvik Dey, <i>PSO, BCO and K-means Based Hybridized Optimization Algorithms for Data Clustering</i> , Conference:2017 International Conference on Information Technology (ICIT), Pages:252-257, Publisher:IEEE, Cited by 2, 21 December 2017, DOI: 10.1109/ICIT.2017.58

Dr. Saidalavi Kalady

S. Saha
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Sl. No	Publication along with DOIs and publication/citation details
1	Saritha Murali, V. K. Govindan & Saidalavi Kalady, <i>Quaternion-based image shadow removal</i> , The Visual Computer, 2021, https://doi.org/10.1007/s00371-021-02086-6
2	Sithara Kanakaraj; Madhu S. Nair; Saidalavi Kalady, <i>Adaptive Importance Sampling Unscented Kalman Filter With Kernel Regression for SAR Image Super-Resolution</i> , IEEE Geoscience and Remote Sensing Letters, Cited By : 1, DOI: https://doi.org/10.1109/LGRS.2020.3031600
3	Sithara Kanakaraj, Madhu S.Nair, SaidalaviKalady, <i>Adaptive Importance Sampling Unscented Kalman Filter based SAR image super resolution</i> , Computers & Geosciences, volume 133, Cited By : 6, year 2019, DOI: https://doi.org/10.1016/j.cageo.2019.104310
4	A Lubna, Saidalavi Kalady, A Lijiya, <i>MoBVQA: A Modality based Medical Image Visual Question Answering System</i> , Conference:TENCON 2019-2019 IEEE Region 10 Conference (TENCON), Pages:727-732, Publisher:IEEE, Cited by 1, 17 October 2019, DOI: 10.1109/TENCON.2019.8929456
5	Saritha Murali, V. K. Govindan , Saidalavi Kalady, <i>Single image shadow removal by optimization using non-shadow anchor values</i> , Computational Visual Media, volume 5, pages 311-324 , Cited By : 5, year 2019 DOI: https://doi.org/10.1007/s41095-019-0148-x
6	Saritha Murali, V. K. Govindan , Saidalavi Kalady, <i>Shadow removal from uniform-textured images using iterative thresholding of shearlet coefficients</i> , Multimedia Tools and Applications, volume 78, pages 21167-21186, Cited By : 1, year 2019, https://doi.org/10.1007/s11042-019-7435-5


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7	RS Reshma Raj, C Gayathri, Saidalavi Kalady, PB Jayaraj, Odd-even based adaptive two-way routing in mesh NoCs for hotspot mitigation, Book:Proceedings of the 20th International Conference on Distributed Computing and Networking, Pages:248-252, 4 January 2019, DOI: https://doi.org/10.1145/3288599.3288611
8	Saritha Murali, Govindan V. K., Saidalavi Kalady, A Survey on Shadow Detection Techniques in a Single Image, Journal of Information Technology and Control, Vol. 47 / No. 1 pp. 75-92, Cited By : 9 year 2018, DOI: 10.5755/j01.itc.47.1.15012
9	Sithara Kanakaraj; Madhu S. Nair; Saidalavi Kalady, SAR Image Super Resolution using Importance Sampling Unscented Kalman Filter, IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing, volume 11, number 2, pages 562-571, Cited By : 9, Year 2018, DOI: https://doi.org/10.1109/JSTARS.2017.2779795
10	Sithara Kanakaraj, VK Govindan, Saidalavi Kalady, Face Super Resolution: A Survey, I.J. Image, Graphics and Signal Processing, 5, pages 54-67, Year 2017, Cited By : 1, DOI: 10.5815/ijigsp.2017.05.06
11	Saritha Murali, VK Govindan, Saidalavi Kalady, A survey on shadow removal techniques for single image, I.J. Image, Graphics and Signal Processing, pages 38-46, Cited By : 6, December 2016, DOI: 10.5815/ijigsp.2016.12.05

Dr. Saleena N.

Sl. No	Publication along with DOIs and publication/citation details
1	Seema Yadav; N Saleena, <i>Sentiment Analysis Of Reviews Using an Augmented Dictionary Approach</i> , 5th International Conference on Computing, Communication and Security (ICCCS), 2020, DOI: https://doi.org/10.1109/ICCCS49678.2020.9277094

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2	EK Jasila, N Saleena, KA Abdul Nazeer, <i>Ontology Based Document Clustering-An Efficient Hybrid Approach</i> , Conference:2019 IEEE 9th International Conference on Advanced Computing (IACC), Pages:153-157, Publisher:IEEE, 13 December 2019, DOI: 10.1109/IACC48062.2019.8971594
3	Ankit , Nabizath Saleena, <i>An Ensemble Classification System for Twitter Sentiment Analysis</i> , Procedia Computer Science, volume 132, pages 937-946, year 2018, DOI: https://doi.org/10.1016/j.procs.2018.05.109
4	N. K. Muhsina; Nabizath Saleena, <i>Redundancy detection: A comparison of lexical and value based approaches</i> , 2017 Second International Conference on Electrical, Computer and Communication Technologies (ICECCT), DOI: https://doi.org/10.1109/ICECCT.2017.8117820
5	Saleena Nabizath, Vineeth Paleri, <i>An Improved Algorithm for Redundancy Detection Using Global Value Numbering</i> , Journal of Information Processing Systems, volume. 12, number 2, pages. 214-225, Cited By : 1, 2016, DOI: https://doi.org/10.3745/JIPS.02.0014

N. K. Muhsina
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Appendix II

2022 Dec - 2023 July



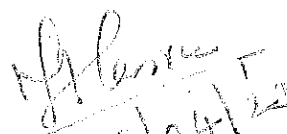
**Department of Computer Science and Engineering
NIT Calicut
Academic/Administrative Additional Responsibilities at the Department-Level**

Duties per Faculty December 2022 onwards

Sl. No	Duty	Faculty in charge	
Programme Coordinators			
1.	Ph. D	Vineeth Paleri, Jimmy Jose, Amit Praseed	
2.	M. Tech (CS)	Gopakumar G	
3.	M. Tech (IS)	S. D. Madhu Kumar	
4.	M.Tech (AI &DA) - (To start)	K. A. Abdul Nazeer	
5.	MCA	P. Arun Raj Kumar	
6.	B. Tech	Vinod Pathari	
Faculty Advisers			
1.	MCA 2021 Admission	Jay Prakash	
2.	MCA 2020 Admission	Prabu Mohandas	
3.	B. Tech 2019 Admission	Vinod Pathari, Jimmy Jose, Lijiya A, Vasudevan A. R	
4.	B.Tech 2020 Admission	Sumesh T. A., Jayaraj P. B. Pranesh Das, Raju Hazari, Anand Babu N B	
5.	B. Tech 2021 Admission	Saidalavi Kalady, Srinivasa T. M., Anil Pinapati Anu Mary Chacko, S. Sheerazuddin	
6.	B. Tech 2022 Admission	Gopakumar G, Manjusha K, Hiran V. Nath, T Veni, Renjith P	
Class Committee Chairpersons			
1.	B. Tech 2019 Admission	Vineeth Paleri	
2.	B. Tech 2020 Admission	S. D. Madhu Kumar	
3.	B. Tech 2021 Admission	Priya Chandran	
4.	B. Tech 2022 Admission	HoD	
5.	MCA 2020 Admission	Saidalavi Kalady	
6.	MCA 2021 Admission	Jimmy Jose	
7.	M.Tech 2022 Admission	K A Abdul Nazeer	
Academic Committees / Representatives / Coordinators			
	Duty	Staff in charge	Faculty in charge
1.	Department Academic Calendar	Sreeja V	Priya Chandran

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2.	CSED Exam Cell, Class Committee coordination and Vigilance Committee	Biju Francis	Vineeth Paleri Saidalavi Kalady Joe Cheri Ross
3.	Time Table, DSS/IMS entries(DTTC- CSE Dept. Time Table Coordinator), Adhoc Faculty Selection Process, Representative to Institute TT Committee.		Arun Raj Kumar, Srinivasa T M, Sumesh T A , Vasudevan A. R.,
5.	CSE representative to First Year Coordinator		Hiran V Nath
6.	Academic Quality Monitoring Committee (AQMC) and Internal Quality Assurance Committee (IQAC) - Swayam Coordinatorship		Lijiya A. (Chairperson) , Saidalavi Kalady, Murali Krishnan K, Vasudevan A R, Pranesh Das
7.	NBA Coordination Committee		Subashini R (Chairperson) AQMC and IQAC members, Program Coordinators, Manjusha K, Joe Cheri Ross, Amit Praseed, Exam Cell Representative (Saidalavi Kalady)
8.	Coordinator for Computer Programming ZZ1004D		Hiran V Nath
9.	Department Postgraduate Committee (Including Curriculum Revision Activities)		S. D. Madhu Kumar(Chairperson), Priya Chandran, K A Abdul Nazeer K A, Vineeth Paleri, Arun Raj Kumar, Gopakumar G, Venkatarami Reddy Clintapalli, Joe Cheri Ross, Pournami P N
10.	Department Undergraduate Committee (Including Curriculum Revision Activities)		Vinod Pathari(Chairperson), Murali Krishnan K, Sumesh T A, S. Sheerazuddin S, Renjith P, Nirmal Kumar Boran
Laboratories for UG and PG laboratory courses & Departmental Facilities			
1	Software Systems Lab (SSL) - All Systems	V. R. Ajayachandran	Hiran V Nath, Venkatarami Reddy Chintapalli
2	Network Systems Lab (NSL) - All Systems	Biju Francis	Sumesh T A, Sheerazuddin S, Nirmal Kumar Boran
3	Big Data & Bio-computing Lab - Common Area	Biju Francis	K. A. Abdul Nazeer, Gopakumar G
4	ITL Server Room	V. R. Ajayachandran	Jayaraj P. B, Gopakumar G, Nirmal Kumar Boran
5	CSED UPS and Records Room	V. M. Abdul Sathar	T. A. Sumesh, Amit Praseed
Research Groups and Associated Laboratories			
1	Algorithms and Formal Methods (ITL 306)	V. R. Ajayachandran	Subashini R., Subhasree M., Sheerazuddin S., Renjith P. , Anand Babu N.B.
2	Bioinformatics, AI, and Data Analytics (BDBL)	Biju Francis	K A Abdul Nazeer , Gopakumar G
3	Hardware and Security (HES Lab I)	Sreeja V	Hiran V. Nath, Jimmy Jose, Srinivasa T. M., Vasudevan A. R. , Nirmal Kumar Boran, Amit Praseed


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4	Systems and Verification (HES Lab 2)	Sreeja V	K. Murali Krishnan, Saidalavi Kalady , Sheerazuddin S. Veni T., Venkatarami Reddy Chintapalli
5	Social Media Analytics and Cloud Security (Secure Computing Lab)	V. R. Ajayachandran	Anu Mary Chaeko, Lijiya A. , S. D. Madhu Kumar, Priya Chandran.
6	Secure Communication Systems (Cloud Computing Lab)	V. M. Abdul Sathar	Anil Pinapati, Arun Raj Kumar , Priya Chandran, Vinod Pathari, Venkatarami Reddy Chintapalli
7	Intelligent Computing (IP Lab)	V. M. Abdul Sathar	Ponrnami N. P. , Prabu M., Jayaraj P. B., Gopakumar G., Amit Praseed, Joe Cheri Ross, Manjusha K.
8	Machine Learning and Computational Intelligence (ML Lab)	V. M. Abdul Sathar	Jay Prakash, S. D. Madhu Kumar, Pranesh Das, Raju Hazari , A Sudarshan Chakravarthy, Joe Cheri Ross

Administrative Committees			
1.	DCC Secretary		A Sudarshan Chakravarthy, Anii Pinapati
2.	DCC Staff Representative	V. R. Ajayachandran	
3.	CSE Association	V. R. Ajayachandran	S. D. Madhu Kumar, Jayaraj P. B.
4.	Dept. Information Cell / RTI / Ranking		Murali Krishnan K, Saidalavi Kalady, Nirmal Kumar Boran
5.	Central Library - LAC Member	Sheerazuddin S	
6.	Placement Committee Representative: 2022-23	Vinod Pathari	
7.	SGC representatives from department	Anu Mary Chacko, Raju Hazari, Renjith P.	

Technical, Infrastructure, Amenities & Purchase			
1.	Department Purchase	V. R. Ajayachandran V. M. Abdul Sathar Biju Francis	M. Prabu Sumesh T. A. Sheerazuddin S. Hiran V. Nath Gopakumar G. (HoD's Nominee)
2.	Institute Space Committee Representatives	Abdul Nazeer K. A. (Coordinator), Lijiya A	
3.	Resource Allocation and Management for facilities for faculty	Jimmy Jose, Hiran V. Nath, V R Ajayachandran, Anil Pinapati	
4.	Department representative to Institute Eduserver committee	Srinivasa T M, P. Arun Raj Kumar	
5.	Departmental Computing Facilities and Equipment - Repair and Maintenance using DOC funds	V. R. Ajayachandran Biju Francis V. M. Abdul Sathar	Lijiya A., Muraii Krishnan Vinod Pathari, Anand Babu N B
6.	Stock Update and Clearance	V. R. Ajayachandran V. M. Abdul Sathar Biju Francis, murali	Saidalavi Kalady, Murali Krishnan K.
7.	APJ Abdul Kalam Conference Room	V. M. Abdul Sathar	

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8.	CSED Seminar Hall, NLHC 102	V. M. Abdul Sathar	
9.	CSED Office, Discussion Room, CSED LAN	Biju Francis	
10.	Classrooms, Amenities - Monitoring and maintenance		Lijiya A., Amit Praseed, Nirmal Kumar
	Cleanliness of Classrooms, Faculty Rooms, Electrical fittings, Drinking water etc.	V. R. Ajayachandran Thanka	
11.	CSED Eduserver		Lijiya A, Renjith P, Anand Babu N B
12.	CSED Website	Sreeja V.	Jimmy Jose, Hiran V Nath, Manjusha K, Venkatarami Reddy Chintapalli
13.	Institute web management committee (Department representatives)	Sreeja V.	Pournami P N, Anand Babu
14.			
Special Technical Committees			
13.	IP Camera, Fingerprint Scanner, Wi-Fi and Network Equipments	Biju Francis	Hiran V. Nath
	AC units maintenance	Abdul Sathar, V. R. Ajayachandran Biju Francis	Jayaraj P. B.
	UPS units maintenance	Abdul Sathar, V. R. Ajayachandran Biju Francis	Sumesh T. A.
Consultancy, Projects and External Interactions			
1.	Interactions, MOU, Linkage with Academic Institutions	S.D. Madhu Kumar, Murali Krishnan K, Amit Praseed	
2.	Interactions, MOU, Linkage with Industry / Govt. Organizations	Anu Mary Chacko, Joe Cheri Ross	
3.	Sponsored Research & Consultancy Coordinators	M. Prabu, A Sudarshan Chakravarthy, Anil Pinapati	
4.	Scholarships [SJET, Exterual]	Veni T	
5.	Emergency Student Support Fund (ESSF) [for B.Tech. CSE students]	Subashini R, Vinod Pathari	


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HOD, CSED

