

A. G. Ramakrishnan

Designation : Professor, EE

Age and date of birth : 62 yrs ; February 14, 1958

Details of service at the Institute

Date from	Date to	Designation
April 23, 2015	Nov. 5, 2018	Chairman, EE
August 16, 2009	Till date	Professor
June 22, 2002	August 15, 2009	Associate Professor
March 30, 1994	June 21, 2002	Assistant Professor
Feb. 23, 1992	March 29, 1994	Research Associate

A nutshell overview of CV:

Fellow of INAE, Nov. 2019.

Graduated 16 Ph Ds, 14 M Tech (Res) and 81 ME projects.

Created Lipi Gnani, Kannada OCR that has decisively beat Google's Tesseract OCR.

Google scholar citations of 3750 and h-index of 30.

Total funds brought to the Institute in my career: Rs. 28.5 Crores.

Floated new courses of (i) Biometrics, (ii) Document Analysis and Recognition, (iii) DSP System Design. (iv) Machine Learning in Neuroscience.

My Novel Coronavirus awareness youtube video has 15,000 views from 14 countries.

IISc-incubated start-up RaGaVeRa funded by GoK under Elevate2019 and named as one of the top 5 startups in Indian language technologies by

Invited Member, Karnataka Knowledge Commission.

Invited Member, Senate, IIIT Allahabad.

Jaya Jayant Award for Teaching, 2016.

Manthan Award, South East Asia and Asia Pacific, 2014 and 2015.

Details of research experience elsewhere:

S.No.	Place of Training	Position	Period	Country
1.	HP Labs India, Bangalore	Principal Research Scientist, Lang. Tech.	May 2002- Aug. 2003	India
2.	University of Kaiserslautern	Visiting Scientist	May 1997 – Aug 1997.	Germany
3.	Fetzer Institute, Kalamazoo, MI	Post Doctoral Fellow	Sept. 1990 – Oct. 1991.	USA
4.	BPL India Ltd.,	Senior R & D Engineer		India

5. Bangalore
Biomedical Engg Division, IIT Madras Senior Project Officer Dec. 1988 - Sept. 1990 India
1986 – 1988.

Guidance of research students/ postdocs

Program	Awarded before the period under review	Awarded during the period under review	Total Awarded	In Progress
Ph. D.	6	10	16	6
M.Sc. (Engg)/ M Tech (Res)	12	3	15	-
Total (Res. Students)	18	13	31	6
M Tech Projects	54	27	81	5
Postdocs	0	-		2

Professional awards/recognition during the period under review:

S.No.	Name	Year	Donor organization
17.	Fellow, INAE	2019-	Indian National Academy of Engineering
16.	Invited member of Senate, IIIT Allahabad	2019-	Director, IIIT-Allahabad, Prayagraj
15.	Invited Member, FICCI – Indian Lang. Internet Alliance	2018-	Fed. of Indian Chambers of Commerce and Industry
14.	Member, Karnataka Knowledge Commission	2017 -	Government of Karnataka (Karnataka Jnana Aayoga)
12.	Associate Editor, Sadhana	2017-	Indian Academy of Sciences
11.	Jaya Jayant Award for Teaching Excellence in Engineering	2016	Governing Council, IISc
10.	Vice President	2015-	Indian Unit for Pattern Recognition and Artificial Intelligence
9.	Manthan Award – e-education category	2015	Digital Empowerment Foundation
8.	Editorial Board, Current Science	2015-2016	
7.	Manthan Award - e-inclusion & accessibility	2014	Digital Empowerment Foundation
6.	Kannada TTS - II Place in Blizzard Challenge	2014	Univ. of Edinburgh, UK
5.	Tamil and Kannada TTS - II Place in Blizzard Challenge	2013	Univ. of Edinburgh, UK
4.	Prof. M Anandakrishnan Award for the best paper	2013	International Forum for Info Technology in Tamil

Professional awards/recognition before the period under review:

S.No.	Name	Year	Donor organization
3.	President	2002-2008	Biomedical Engineering Society of India
2.	Sir Andrew Watt Kay Young Researcher's Prize	1992	Royal College of Physicians & Surgeons, Glasgow
1.	Thangam Vasudevan Award for the best paper	1986	Indian Association of Biomedical Scientists

Membership of Professional Bodies

- Senior Member, IEEE, NY, U.S.A., Signal Processing & Engineering in Medicine and Biology Societies
- Member, Acoustical Society of America.
- Member, International Speech Communication Association.
- Member, Biomedical Engineering Society of India
- Member, Indian Unit for Pattern Recognition and Artificial Intelligence (IUPRAI)
- Fellow, Institution of Electronics and Telecommunication Engineers (India)
- Fellow, Institution of Engineers (India).
- Member, Association for Computing Machinery (ACM)
- Member, International Forum for Information Technology in Tamil (INFITT), Singapore. (General Council Member: 2012-2016)

Publications (The lists of Journal and Conference publications are attached as Appendices II and III, respectively.)

	Period before review	Period under review	Total
Published in Journals	21	23	44
Presented at Conferences	132	86	218
Book Chapters	0	2	2
Patents – Response to FER Filed	0	2	2
Filed	0	1	1
Approved & given to attorney	0	2	2

Google Scholar Citations as on May 25, 2020:

Citation Indices	All	Since 2013
Citations	3750	1682
h-index	30	20
i10-index	91	51

Web of Science h-index (Publons, under Clarivate Analytics): 18

Awards won by my students during the period under review:

Deepak Kumar:

- Best in Robust Reading Competition – Task I: Word Recognition from arbitrarily oriented scene word images, ICDAR 2015, Beijing, China.
- II Position in Robust Reading Competition – Task I: Word Recognition from born-digital images, ICDAR 2013, Washington DC, USA.
- Best in Robust Reading Competition – Task I: Text Localization, ICDAR 2011, Beijing, China.

Gandhian Young Technological Innovation (GYTI) Award, 2015. (H R Shiva Kumar)

TCS Ph D research fellowship, 2012. (A P Prathosh)

Awards won by my students before August 2009:

MSRI Ph D Research Fellowship, 2004. (Peeta Basa Pati)

Best M Sc (Engg) thesis in the Division of Electrical Sciences, 1997. (Supratim Saha)

Patents filed during the period under review:

- T. Kasar and A. G. Ramakrishnan, "A method to extract and align text of an image captured and a system thereof," Indian Patent Office Reference. No: 109/CHE/2011, 2011.
- Suresh Sundaram and A. G. Ramakrishnan, "Attention feedback based robust segmentation of online handwritten words," Indian Patent Office Reference. No: 03974/CHE/2010.
- Ram Krishna Pandey and A. G. Ramakrishnan, "Method and system for enhancing binary document image quality for improving readability and OCR performance," Indian Patent Office Reference. No: TEMP/E-1/33470/2018-CHE, 2018.

Patents approved by IPTel and with the attorney:

- A G Ramakrishnan, Shiva Kumar H R, "Interval tree based robust segmentation of overlapped text lines from handwritten and old printed documents of complex scripts," Invention 2018/71/ES/EE, with K & S Partners, under preparation to be filed.
- A G Ramakrishnan, Shiva Kumar H R, "Attention Feedback in OCRs for Robust Handling of Merges, Splits and Interspersed English Words," with Lakshmikumaran and Sridharan Attorneys, under preparation to be filed.

Patents filed before August 2009: Nil.

Sponsored Projects brought to EE, IISc as Chairman, EE (Rs. 8.95 crores)

Title	Funding Agency	Value (Rs. Lakhs)	Duration (years)
Design and development of Smart Energy Systems Infrastructure	DST - FIST	7.15 crores	2017 - 2022.
Centre for Advanced Study – Phase V	UGC - CAS	1.8 crores	2018 - 2023

Industrial Research Projects brought to the Institute (Rs 9.75 crores)

Title	Industry	Value (lakhs of Rs.)	Duration	Deliverables
Wipro-IISc Research & Innovation Initiative	Wipro Ltd.	9.75 crores	May 2018 – May 2021	Individual projects for faculty, Ph D scholarships, simulation platform creation for autonomous vehicle research.

Sponsored Projects during the period under review (Rs. 6.3 crores so far)

Title	Funding Agency	Value (Rs. Lakhs)	Duration (years)
Industrial grade DNN-based OCR for Kannada (under Bahu Bhashak project)	MeitY, Govt of India	1.33 crores	Mar 2020 - Mar 2021.
Digitization of ancient manuscripts in old languages using multimodal recognition of speech and online handwritten transcript of an expert in the loop.	Imprint-2 (MHRD)	78	May 2019– May 2022.
Speech to text (speech recognition) system for Kannada using deep neural networks and hidden Markov models	Dept. of Kannada & Culture, GoK	64.17	Feb. 2019- Feb 2021
Speaker and background change detection	DRDO	25.0	Oct 2014- Sept 2018
Development of Online Handwriting Recognition System for Indian Languages (OHWR) - Phase II - Deployment of an application and improvement of engine performance (Leader of the research Consortium)	DeitY.	210 (consortium total: 750)	May 2010- June 2016
Development of Robust Document Image Analysis and Recognition System for Printed Tamil and Kannada (one of the Co-Coordinator of the research consortium)	DIT, MCIT, Govt of India.	120.0	July 2010- June 2016

Sponsored Projects before August 2009: (Rs. 2.45 crores)

Title		Funding Agency	Value (Rs. Lakhs)	Duration (years)
Consortium for Online Handwriting Recognition System for Indian Languages	Dept. of Information Technology (DIT), Ministry of Communication and Information Technology (MCIT), Government of India.	81 (total of 232.7 for the consortium)	Jan. 2007- Nov. 2009	
Recognition Engines for Printed Tamil & Kannada	DIT, MCIT, Govt of India.	42.0	Dec. 2006- Sept. 2009	
Automated Book Reader for the Visually Challenged	Ministry of Social Justice and Empowerment, Government of India	29.7	June 2007- May 2009	
Vitiligo: Developing a prognostic tool to assess repigmentation	Kerala State Council for Science and Technology	5.75	Jan 2009 – Dec 2010	
OCR for south Indian language scripts	Dept. of Info. Tech. MIT, Govt. of India	4.9	2000-02	
Algorithms for Kannada speech synthesis	Dept. of Info. Tech. MIT, Govt. of India	6.9	2000-03	
A PC-based speech synthesis system in Tamil	Tamil Nadu Dept. of Info. Technology	4.5	2000-2001	
Effect of yoga on visual performance in aviation	Aeronautics Research & Development Board	5.2	1998-2000	
Satellite image Processing and analysis (Co-PI)	Indian Space Research Organisation	65.0	1997-2002	
Kannada speech synthesis	Karnataka State Council for S & T	0.9	1999-2000	
Portable analyzer for neurological diagnosis	Dept. of Science & Tech, Govt. of India	1.8	1994-96	

Accomplishments of the Online handwriting recognition Consortium:

- I was the Leader of this Public- Private Partnership Consortium mode project.
- 7 participating Institutions: IIT Madras, IIT Guwahati, ISI Kolkata, IIIT Hyderabad, IISc Bangalore, CDAC Pune, and Thapar University, Patiala.
- Recognition technology was developed for Tamil, Kannada, Malayalam, Telugu, Bangla, Assamese, Gurmukhi and Hindi.
- 4 patents, 11 journal and 56 conference publications came out of this consortium.
- I received Prof. M. Anandakrishnan Award by INFITT at International Tamil Internet Conference 2013, University of Malaya, Kuala Lumpur for the Tamil OHWR engine.
- Uploaded both Windows and Android smart input panels in all the languages on the TDIL and myGov websites for download by anyone.
- A new XML standard has been created for annotating online handwritten data.
- Created a national level repository of annotated and validated database of 100, 000 online handwritten words from at least 500 writers in each of the above languages.

Features of the project “Recognition Engines for Printed Tamil & Kannada”

- I was one of the co-coordinators of this National level Consortium mode project with Prof. Santanu Chaudhury, IIT Delhi as the consortium leader.
- 13 participating Institutions: IIT Delhi, IISc, IIIT Hyderabad, ISI Kolkata, Univ of Hyderabad, Punjabi University, CDAC Noida, MS Univ Baroda, CDAC Pune, IIT Guwahati, IIT Bombay, IIIT Allahabad and Manipur University.
- I developed recognition technology for printed text in Tamil and Kannada
- I received Manthan Award 2014 (e-inclusion & accessibility) for conversion of over 500 Tamil books to Braille books, used by a large number of blind students.
- Windows based limited version of the OCRs to be released by DeitY within a month.
- Another important outcome is a national level repository of annotated database of scanned images of 5,000 pages covering 25 books printed from 1950 to 2007, in each of the above languages.

Teaching

Courses taught during the period under review

Level	Title of Course	Cre-dits	No. of times offered	Taught alone/ jointly	Any other Remarks
300	Machine Learning in Neuroscience	2:1	2	Alone	Designed this new course
200	Matrix Theory	3:0	5	Alone	Hard-core
200	Speech Information Processing	2:1	8	Alone	Soft-core
200	Digital Image Processing	2:1	4	Alone	Soft-corre

Courses taught before August 2009:

Level	Title of Course	Cre-dits	No. of times offered	Taught alone/ jointly	Any other Soft-core Remarks
200	Speech Information Processing	2:1	4	Alone	Soft-core
200	Digital Image Processing	2:1	5	Alone	Soft-core
200	Biometrics	3:0	3	Jointly	Designed this new course
200	Digital Signal Processing	2:1	1	Jointly	Soft-core
200	DSP System Design	3:0	1	Alone	Designed this new course
200	Computer Vision	2:1	5	Jointly [twice alone]	Soft-core
200	Biomedical Signal Processing	3:0	3	Jointly	Soft-core

				[twice alone]	
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Short-term courses/Tutorials given

Sl. No	Course	Sponsoring agency	Duration	Target group	Cost of Course
1	Handwriting Recognition	NCVPRIPG, IIT Jodhpur	Dec. 2013	50 Engineers	
2	Summer School on Doc. Image Processing	HP Labs India, Bangalore	June 2008 (10 days)	40 faculty, PG students & Engineers	14.0 lakhs
3	Tutorial on Speech Synthesis in Indian Languages	ICSCN 2007, Anna University, Chennai	Half a day Jan 2007.	50 tutorial registrants.	
4	Tutorial on "Gabor Filters in Image Processing"	ICSCI 2007, Hyderabad	Half a day. Jan 2007.	25 conference registrants	
5	Workshop on Text-to-Speech Technology	IEEE-ICSIP 2006 Hubli.	Half a day. Dec 7, 2006	32 tutorial registrants	
6	Introduction to Speech Signal Processing	RCI, Hyderabad	Half a day. July 14, 2006	36 DRDO Engineers	
7	Online Handwritten Character Recognition	ICSCI 2006 Hyderabad	Half a day tutorial.	20 tutorial registrants	
8	Tutorial on "Recognition of Printed text"	ICSCI 2005, Hyderabad	Half a day. Jan 8, 2005	50 engineers.	
9	Workshop on Text to Speech Synthesis	TDIL, DIT, MCIT, Govt of India	Two days Mar 12-13, 2004	15 Project staff from IITs, CDAC	20,000
10	Tutorial on Iris and Speaker Recognition	ICIT 2003, Bhuvaneshwar	Half a day Dec 25, 2003	50 engineers	
11	Workshop on Speech segmentation and annotation	HP Labs India, Bangalore	2- weeks [Aug 25 - Sep 5, 2003]	15 linguists from all over India.	2 lakhs
12	Tutorial on Biometrics	BMESI (BioVision 2001)	1 day Dec 21, 2001.	170 engineers	2 lakhs

Industrial Consultancy Project completed (Rs 5 Lakhs)

Title	Industry	Value (lakhs of Rs.)	Duration	Deliverables
Consultancy	Wipro Technologies	5.0	Jan – June, 2017	Technical advice on document image processing.

Industrial Research & Consultancy Projects before August 2009: (Rs 1.0 crore)

Title	Industry	Value (lakhs of Rs.)	Duration	Deliverables
Cytocounter [with Prof. K R Ramakrishnan as PI]	KTwo Technology Solutions, Bangalore	9.5	Aug 2007-July 2008.	Algorithms and “C” code for segmenting and classifying white blood cells from colour images of stained blood smear.
Extraction of fields from Document Images	First Indian Corporation, Bangalore	36.0	Jan 2006 – June 2007	Algorithms for extracting specific info from legal document images.
Mobile Cam Capture	Sasken Communication Technologies Ltd., Bangalore	2.0	May –Dec. 2005	Segmentation of handwritten area from camera captured document images & adaptive binarization for mobile messaging.
Investigation of Handwriting Recognition	H P Labs, Bangalore	9.1	Oct. 2003-Oct. 2004	Algorithms for Tamil & Devanagari handwritten character recognition.
Hindi Indian English Corpora Annotation	H P Labs, Bangalore	11.9	Oct. 2003-Oct. 2004	Semi-automated annotation of Speech Corpora
Consultancy on Language Technology	H P Labs, Bangalore	10.0	Aug 2003-Dec. 2004	Advice on language technology research initiatives.
Face Detection and Recognition (with Prof. Y V Venkatesh as PI)	Samsung SDS Co. Ltd. India Development Center	U.S. \$ 40, 000	August 2001 - April 2002	New algorithms and working programs for face detection and recognition
PC based Bio-feedback Monitor	Medicaid Systems, Chandigarh	Rs. 2.06 Lakhs	1999-2000	Data acquisition, Analysis and visualization package.

4. SERVICES PROVIDED (eg. Set up of laboratories, software, etc.)

Setting up of a Language Engineering Laboratory

The facilities created in the Medical Intelligence and Language Engineering (MILE) Laboratory include high fidelity, directional mikes and professional headphones with mikes, high fidelity (SNR) speech acquisition system, flat bed scanners, digital still and video cameras, 20 PCs, two compute servers with 6 GPUs. Work on camera acquired complex document images, recognition of tablet acquired handwriting in Tamil and Kannada as well as on speech synthesis in Kannada and Tamil were conducted by research scholars, M. E. students and project staff. Tamil and Kannada TTS and OCR systems are already running on the Windows and Linux platforms. Our Kannada and Tamil TTS demos

are available on the MILE lab website. The Tamil TTS (**Tamil Gnani**) was evaluated by the Statistical Testing and Quality Control (STQC) Directorate of Ministry of Communication & Information Technology and the test report was published in the Oct 2003 issue of their magazine, "Vishwabharath" in page no. 98. The Tamil and Kannada TTS have also been integrated with the open source screen reader NVDA, and are being used by blind students to read text on the screen. The development of both TTS was not funded and the work procured us the Manthan Award 2015 for e-education. In Blizzard TTS Challenges 2013 and 2014 conducted by CMU and Univ. of Edinburgh, my TTS obtained the second best position, better than that of the TTS developed by the consortium funded by DeitY.

Creation of Resources for Language Technology Research

- **Benchmark Kannada OCR test datasets:** 300-dpi, gray level, scanned images of 250 Kannada pages from old books printed from 1970 to 2002, have been made public as a benchmark test dataset for Kannada OCR, together with ground truth in the International MET/ALTO xml format. Along with this, images of 40 to 60 printed pages each in Tulu, Konkani and Sanskrit, printed in Kannada script have also been released, with the ground truth.
- **Five distinct scene image word datasets with pixel level annotation:** We have annotated the following five publicly available standard word image data sets (> 3600 word images) at the pixel level: ICDAR 2003 data set, Sign Recognition 2009 data set, Street View Text (SVT) 2010 data set, Born-digital 2011 data set, ICDAR 2011 data set. These word images have been originally cropped from camera-captured scene images, born digital images (BDI) and street view images. These annotated images are available for download for research purposes.
- **Font and Background Color Independent Text Binarization:** This is the MATLAB code of the binarization method described in our popular paper for scene text binarization published at the 2nd International Workshop on Camera-Based Document Analysis and Recognition (CBDAR), 2007, Brazil.
- **MAST: Multi-Script Annotation toolkit for Scene Text:** The above scene image data were binarized using a Matlab based semi-automated segmentation tool developed by us, which is also available for download.
- **Tamil Handwritten Word Recognition Dataset:** 15,000 isolated Tamil Words written on a tablet PC by over 60 different school students, containing the stroke coordinates as a function of time, have been annotated at the word and akshara level, using the XML format proposed by us, employing the tool developed by us.
- **Multi-script Robust Reading Competition (MRRC) Database:** MRRC is a competition we conducted as a part of ICDAR 2013, with multiple tasks of multi-script scene text localization, segmentation and recognition. The dataset created by us for this competition is available for download.
- **OCR Test Data, with ground truth:** 5000 scanned (300 dpi, 8-bit gray, uncompressed tif) pages each of Tamil and Kannada, from books printed in the period from 1950 till 2002 have been carefully annotated as standard test data, with ground truth text.
- **Tamil TTS Synthesis Database:** 1027 phonetically balanced, Tamil sentences, spoken by a professional speaker, and fully segmented and annotated at the phone level.

- **Kannada TTS Database:** 1100 phonetically balanced, Kannada sentences, spoken by a professional speaker, and fully segmented and annotated at the phone level.
- **Emotional speech database for prosody studies:** An entire Tamil drama, recorded twice from a professional speaker: once with standard accent, without any emotion, and another time, with emotions as demanded by the drama text. This is annotated, and can be used for research on prosody in emotional speech and its modeling.
- **Script recognition Dataset for 11 Indian Scripts:** 20, 000 word images of printed text of different font styles and sizes have been collected in each script, for script recognition research, and are available for download.
- **Database for studying natural variability in human speech:** Ten distinct Tamil sentences, each spoken 10 times, at 10 different times of the day over a period of few days, by 10 native speakers. This data can be used to study the variability in natural speech of human beings, and also to incorporate such healthy variability in synthesized speech, through appropriately designed models.
- **Chappani Multilingual Indic Keyboard Interface (Android, Windows, Linux):** An open source project, providing input method for both South Indian and North Indian scripts. Separate versions are available for Android, Windows and Linux. It has an easy to use user interface for adding new layouts and new scripts.
- **The handwriting recognition engines** developed by us for Tamil and Kannada can be downloaded from TDIL website for both Android phones and Windows Tablet PCs.

8. PLAN FOR FUTURE RESEARCH:

Research work in neuroscience.

1. Submitted proposal entitled ***“Multimodal studies on controlled breathing exercises and pranayama practices, including breath holding,”*** (Ref. No. TPN / 47900) to DST Science & Technology of Yoga and Meditation in April 2020. Budget: Rs 53.3 lakhs.
2. Submitted proposal entitled ***“A comprehensive review of factors that enhance the readiness level of the immune system and also those that impair immunity”*** (Ref. No. DST/SATYAM/COVID-19/2020/251) to DST Science & Technology of Yoga and Meditation in May 2020. Budget: Rs. 6.9 lakhs.
3. Research study planned on identifying the right kind of sensory stimuli (auditory, olfactory, visual and touch) to be presented to comatose patients and the right time of the day for optimal response and accelerated neuro-rehabilitation. In collaboration with Dr. Sharan Srinivasan, neurosurgeon, Mahaveer Jain Hospital, Bangalore.

DNN-based neural TTS in Prime Minister’s voice.

- Using the speech recordings and the corresponding transcripts available for the 53 different episodes of Mann Ki Baat of our Prime Minister, we are working on developing a Hindi TTS in PM’s voice by training this data, suitably curated, on Tacotron-2 framework.
- Preliminary research work towards the above has already produced a decent quality American English TTS and a reasonable quality, Sanskrit TTS, using available free speech data online.

DNN based domain-tunable ASR – Kannada (also Tamil, Hindi and Sanskrit).

- Under a project funded by the Government of Karnataka, we have started working on a huge vocabulary (~ a million words), domain-independent, and speaker-independent automated speech recognition system for Kannada, using deep neural networks and graphical models.
- Along with this, we are also working on ASRs for Tamil and Hindi and versions with around 1.75 lakh vocabularies are available for demo.

Ongoing research (along with funded project) on DNN-based OCR

A pilot project has been granted by MeitY for Rs. 1.33 crores for one year for designing a state-of-the-art, end-to-end deep learning OCR for Kannada using CNN-LSTM combination. If the project is successful, there is a promise of a major project for Rs. 29 crores for creating such OCRs for all the major Indian languages (scheduled languages under the Constitution)

My contributions towards the goals of Institute of Eminence (IoE)

- MoU with N P Becktereva Institute of the Human Brain, St. Petersburg, under the Russian Academy of Sciences, has been signed with the International Relations Cell, for signature from both sides.
- Worked single-handedly with Wipro Ltd. over 3 years, and created an MOU with IISc and SID and brought in a research investment of Rs. 9.75 crores over 3 years.
- Envisioned the Department of EE getting a major FIST grant, and motivated all the colleagues in preparing a great proposal in the area of **Smart Energy Systems**, presented it during the different phases, and pursued it vigorously to its success, which resulted in a grant of Rs. 7.15 crore DST FIST grant to the department.
- Submitted a comprehensive proposal to UGC, presented it in Delhi and pursued it to get UGC-CAS Phase V grant of Rs. 1.8 Crores in mid 2018.
- Proposal for Rs. 78 lakhs sanctioned under IMPRINT-2A.
- A consortium project for OCR for a total budget of Rs. 29 crores is expected from MeitY before September 2019.
- One postdoc under DST-CSRI started working since June 2019.

Services to the Institute – member of the following committees

- Chair, Faculty Search Committee, Dept. of EE, since Jan. 2019 and been a member of faculty search committee for several years, and now part of Divisional FSC.
- As Chairman of EE, created the process of interview based admission to M Tech (EE), which arrested the exodus of students to public sector industries. The success of this then led to interviews being conducted for all other M Tech branches in EECS division, namely, SP, C&N, CS, Microelectronics and AI.
- Encouraged all the young faculty members to apply for SERB-Early Career Grant, and all the Assistant Professors, who joined after 2015 have obtained the grant.

- Created a committee to look into the merger of M Tech programs in SP and SE, which ultimately led to the EECS division-wide M Tech in Artificial Intelligence.
- Active participant in the committee that unified the names of all the Master's programs in the Institute as M Tech and M Tech (Res).
- Member of Departmental Curriculum Committee (DCC) from 2009 – 2018.
- Convenor, M Tech (SP) programme for several years.
- Conducted Interview for selection of sponsored candidates (DRDO, Defence, ISRO) for admission to M Tech in EE, SSA, SE and SP.
- Conducted Interview for selection of regular candidates for M Tech (SP).
- Member of External Research Program Committee.
- Member, Admissions Committee.
- Member of the committee for representing IISc on the COAP effort by IITs (M Tech admissions)
- As Chairman of EE, looked into all the cases of registration cancelled research students and brought order to the same.
- Prepared the evaluative report of the Department for NAAC.
- Prepared the UGC report.
- Prepared and presented the report for the Divisional review committee.

Selection Committees & Academic Advisory Roles in other Institutions – during the period under review

- Member of promotion committee of DRDO from Scientist F to Scientist G, 2019.
- Selection Committee for Professorship in Biomedical Engg at IIT Madras.
- Selection Committee for Assistant Professors in Info Tech at IIIT, Allahabad.
- Selection Committee for Assistant Professors in Biomedical Engg at IIT Dharwad.
- Selection Committee for faculty in Electrical Engineering of NIT, Rourkela.
- Selection Committee for Assistant Professors in Biomedical Engg at NIT, Raipur.
- Selection Committee for Professors in Electrical Engg at NIT, Calicut.
- Committee for internal promotion of faculty of NIT, Rourkela.
- Selection Committee for Assistant Professors in Electronics & Communication at Thapar University, Patiala.
- Thesis examiner for Ph D at IIT Kharagpur, Hyderabad, Guwahati, Jodhpur, ISI Kolkata, NIT Surathkal, Thapar University, Punjabi University in Patiala, JNU Delhi, M S Univ. Baroda.
- Associate Editor, Sadhana, 2017 -.
- Associate Editor, Current Science, 2015 – 2016.
- Invited member of the Senate, IIIT Allahabad, from March 2019.
- Member of Governing Council, SIT Tumkur, Nov. 2015 – Nov. 2018.
- Board of Studies, International School of Information Management (ISiM), University of Mysore.
- Member of Project Advisory Committee, Linguistic Data Consortium in Indian Languages, Central Institute of Indian Languages, Mysore.
- PRSG Chairman, DeitY sponsored project on writer identification at IIT Guwahati.
- Chairman of promotion committees of DRDO for Scientists B, C, D, E.

Selection Committees & Academic Advisory Roles in other Institutions – before August 2009:

- Selection Committee for faculty in Biomedical Engg at IIT Delhi.
- Selection Committee for Assistant Professors in Biomedical Engg at NIT, Raipur.
- Thesis examiner for Ph D at IIT Bombay, NIT Calicut, Punjabi University in Patiala.
- Board of Studies, International School of Information Management (ISiM), University of Mysore.
- Member of Project Advisory Committee, Linguistic Data Consortium in Indian Languages, Central Institute of Indian Languages, Mysore.

Recent Keynote and Invited Talks

- Keynote Speech on “Deep neural networks and graphical models for large vocabulary, automated speech recognition in Tamil,” at Tamil Internet Conference at Anna University, Sept. 20 2019.
- Invited talk on “Increasing the signal-to-noise ratio of our brain and body”, Fusion 2019, Ramaiah Hospital Auditorium, 24 Feb. 2019.
- Plenary talk on “Recognition of online handwriting in Indian languages,” in SOIL-Tech 2019, Feb. 16, 2019.
- Keynote talk on “Attention Feedback Vs DNN aka Lipi Gnani OCR Vs Google's Tesseract,” in DAR-2018, ICVGIP 2018, IIIT Hyderabad, 18 Dec. 2018.
- “Mathematics for Machine Learning: A geometric approach,” QIP course on "Machine Learning and Its Application" at IIT Roorkee during 9-13 July, 2018.
- Keynote talk in International Conf. on Multimedia processing, Communications and Information technology (MPCIT 2018) at Jawaharlal Nehru National College of Engineering, Shivamogga, 8 June 2018.
- “Technologies in Indian Languages for people with visual disability,” IEEE Students’ Chapter, Marwadi University, Rajkot, 27 Jan 2018.
- Keynote lecture on “Medical Signal and Image Processing - Problems and Challenges,” as part of the Research Colloquium at NIT Calicut, 25 March 2017.
- Invited talk on “Linear Algebra as applied to Image Processing,” in Workshop on Speech Signal and Medical Image Processing (WSSMIP’17), SRM University, 21 Sept. 2017.
- Invited talk on, “Speech Recognition - a vector space approach,” in the Workshop on Speech Signal and Medical Image Processing (WSSMIP’17), SRM University, 21 Sept. 2017.
- Invited talk on “DST through applications,” Dept. of ECE, BITS-Pilani, Dubai Campus, Oct. 6, 2016.
- Invited talk on “Applications of machine learning in handwriting, text, script and speech recognition,” in the Short Term Programme on Advanced Optimization and Applications, NIT Raipur, 7 Aug. 2015.

Appendix I: List of Ph D and M Sc (Engg) theses

Ph D Theses awarded during the period under review:

- P1. Knowledge-driven training of deep models for better reconstruction and recognition, Feb. 2020. (Ram Krishna Pandey).
- P2. Class-specific and noise-specific enhancement approaches for speech, Dec 2019. (Nazreen P M).
- P3. Devanagari online handwritten character recognition, June 2019. (Anand Sharma)
- P4. Attention-Feedback and Representations in OCR, June. 2019. (Shiva Kumar H R)
- P5. Speech and noise analysis using sparse representation and acoustic-phonetics knowledge, August 2017. (K. Venkata Vijay Girish).
- P6. Temporal Processing for Event-based Speech Analysis with Focus on Stop Consonants, Sept. 2015. (Prathosh A P)
- P7. Efficient Design of Embedded Data Acquisition Systems based on Smart Sampling, March 2015. (J V Satyanarayana)
- P8. Algorithms for text segmentation from scene images, March 2014. (Deepak Kumar)
- P9. Lexicon-free recognition strategies for online handwritten Tamil Words, March 2012. (Suresh Sundaram)
- P10. Camera-Captured Document Image Analysis, March 2012. (Thotreingam Kasar).

Ph D Theses awarded before August 2009:

- P11. Techniques for Rapid MR Imaging, October 2008. (Neelam Sinha)
- P12. Analysis of Multilingual documents with complex layout and content, May 2007. (Peeta Basa Pati)
- P13. 3D Coding of MR Images and Estimation of Hemodynamic Response Function from fMRI Data, July 2005. (R Srikanth)
- P14. Algorithms for Speech Analysis and Synthesis, August 2003 (R Muralishankar)
- P15. Evoked Potential Signal Enhancement using Wavelet Transforms, August 2002. (G Sita)
- P16. Image Processing Algorithms for Improved Medical Diagnosis, May 2002. (K. N. Bhanuprakash)

M Sc (Engg) Theses awarded during the period under review:

- MS1. Pitch-synchronous discrete cosine transform features for speaker identification and verification, Defence conducted on skype, April 2020 (Amit Meghanani).
- MS2. Characterization of the voice source by the DCT for speaker information, Sept 2014. (Abhiram B)
- MS3. Segmentation strategies for scene word images, Sept 2014. (Anil Prasad)

M Sc (Engg) Theses awarded before August 2009:

- MS4. A research bed for unit selection based text to speech synthesis system, April, 2009. (K Parthasarathy)
- MS5. Explicit Segmentation of Speech for Indian Languages, July 2008. (H G Ranjani)

- MS6. Music and Speech Analysis using Bach filter-bank approach, August 2007. (G Ananthakrishnan)
- MS7. Algorithms for Processing Polarization-rich Optical Imaging Data, February 2005. (R S Umesh)
- MS8. Shape Adaptive Integer Wavelet Transform based Coding Scheme for 2D/3D Brain MR Images, November 2004. (Abhishek Mehrotra)
- MS9. Segmentation and Classification of Colour Images of Blood Cells, August 2003 (Neelam Sinha)
- MS10. Feature Transformation for Speaker Identification, March 2002. (A. Vijayakrishna).
- MS11. Machine Recognition of Printed Kannada Text, January 2002. (K. B. Vijay Kumar).
- MS12. Bilingual OCR for Tamil and Roman Scripts, January 2002. (Dhanya D).
- MS13. Machine Recognition of Printed Odiya Text, October 2000. (Peeta Basa Pati)
- MS14. Modified VQ Coders for ECG, May 1998. (Phani Narasimham)
- MS15. Algorithms for ECG Compression after Period and Amplitude Normalization, June 1996. (Supratim Saha)

Appendix II: LIST OF JOURNAL PUBLICATIONS

Journal Papers Published during the period under review:

- J1. Shiva Kumar H R, A G Ramakrishnan, "Lipi Gnani - A Versatile OCR for Documents in any Language Printed in Kannada Script", ACM Transactions on Asian and Low-Resource Language Information Processing, Vol. 19 (4), May 2020.
- J2. TV Ananthapadmanabha, KV Vijay Girish, AG Ramakrishnan, "Relative occurrences and difference of extrema for detection of transitions between broad phonetic classes," Sadhana, 2018.
- J3. RK Pandey, AG Ramakrishnan, "Efficient Document-Image Super-Resolution Using Convolutional Neural Network," Sadhana, March 2018.
- J4. T V Ananthapadmanabha, A G Ramakrishnan, "Intrinsic-cum-extrinsic normalization of formant data of vowels," Journal of the Acoustical Society of America Express Letters, Vol. 140(5), Nov. 2016, pp. EL446 - 451, DOI: 10.1121/1.4967311
- J5. A. G. Ramakrishnan and J. V. Satyanarayana, "Reconstruction of EEG from limited channel acquisition using estimated signal correlation," Biomedical Signal processing & Control, Vol. 27, pp. 164–173, doi:10.1016/j.bspc.2016.02.004, May 2016.
- J6. A P Prathosh, P Sujith, A G Ramakrishnan and Prasanta K Ghosh, , "Cumulative Impulse Strength for Epoch Extraction," IEEE Signal Processing Letters, Vol. 23(4), April 2016.
- J7. Deepak Kumar and A G Ramakrishnan, "Binary classification posed as a quadratically constrained quadratic programming and solved using particle swarm optimization", Sadhana, Dec 2015.
- J8. A G Ramakrishnan, B Abhiram and S R Mahadeva Prasanna, , "Voice source characterization using pitch synchronous discrete cosine transform for speaker identification," Journal of the Acoustical Society of America Express Letters, Vol. 137(6), EL 469, 2015.
- J9. Suresh Sundaram and A. G. Ramakrishnan, "Bigram language models and reevaluation strategy for improved recognition of online handwritten Tamil words," ACM

- Transactions on Asian and Low-Resource Language Information Processing (TALLIP), Vol. 14 (2), June 2015.
- J10. A P Prathosh, A G Ramakrishnan, T V Ananthapadmanabha, , "Estimation of voice-onset time in continuous speech using temporal measures," Journal of the Acoustical Society of America Express Letters, Vol. 136(2), pp. EL122 - EL128, Aug. 2014.
 - J11. Suresh Sundaram and A. G. Ramakrishnan, "Performance enhancement of online handwritten Tamil symbol recognition with reevaluation techniques," Pattern Analysis and Application, DOI - 10.1007/s10044-013-0353-7, Vol. 17(3), pp. 587-609, Aug. 2014.
 - J12. T V Ananthapadmanabha, A P Prathosh, A G Ramakrishnan, , "Detection of the closure-burst transitions of stops and affricates in continuous speech using the plosion index," Journal of the Acoustical Society of America, Vol. 135 (1), 2014.
 - J13. A. G. Ramakrishnan, A.P. Prathosh and T. V. Ananthapadmanabha, "Threshold-independent QRS detection using the dynamic plosion index," IEEE Signal Processing Letters, Vol. 21, No. 5, pp. 554 – 558, May 2014.
 - J14. A. P. Prathosh, T. V. Ananthapadmanabha, and A. G. Ramakrishnan, "Epoch extraction based on integrated linear prediction residual using plosion index," IEEE Transactions on Audio, Speech and Language Processing, Vol. 21 (12), pp. 2471-2480, 2013.
 - J15. J.V.Satyanarayana and A.G.Ramakrishnan, "Low Order Anti-aliasing Filters for Sparse Signals in Embedded Applications," Sadhana, Vol. 38, Part 3, pp. 397-405, June 2013.
 - J16. Suresh Sundaram and A. G. Ramakrishnan, "Attention-feedback based robust segmentation of online handwritten isolated Tamil words," ACM Transactions on Asian Language Information Processing (TALIP), Vol. 12 (1), Article No. 4, March 2013.
 - J17. A Ramesh, C Jagdish, M Nagapoorinima, PN Suman Rao, AG Ramakrishnan, GC Thomas, M Dominic, A Swarnarekha, "Low cost calibrated mechanical noisemaker for hearing screening of neonates in resource constrained settings," The Indian journal of medical research, vol. 135(2), pp. 170 – 176, 2012.
 - J18. Rakesh Rampalli and A. G. Ramakrishnan, "Fusion of complementary online and offline strategies for recognition of handwritten Kannada characters," Journal of Universal Computer Science, Vol. 17, pp. 81-93, 2011.
 - J19. Venkatesh Narasimha Murthy and A. G. Ramakrishnan, "Choice of classifiers in hierarchical recognition of online handwritten Kannada and Tamil aksharas," Journal of Universal Computer Science, Vol. 17, pp. 94-106, 2011.
 - J20. Neelam Sinha, A. G. Ramakrishnan and Manojkumar Saranathan, "Composite MR image reconstruction and unaliasing for general trajectories using neural networks", Magnetic Resonance Imaging, Vol 28 (10), pp. 1468-1484, Dec. 2010.
 - J21. Neelam Sinha , Manojkumar Saranathan and A. G. Ramakrishnan, "Improved kt-BLAST for fast fMRI imaging", Journal of Magnetic Resonance, Vol 204, pp. 273-280, 2010.
 - J22. Neelam Sinha and A. G. Ramakrishnan, "Quality assessment in magnetic resonance images", invited review article, Critical Reviews in Biomedical Engineering, Vol 38(2), pp. 127-141, 2010.
 - J23. Neelam Sinha, Manojkumar Saranathan and A. G. Ramakrishnan, "Dynamic MR imaging using generalized series", International Journal of Magnetic Resonance Imaging, Vol 2(1), pp. 3-21, 2010.

Journal Papers Published before August 2009:

- J24. Amrik Sen, G. Ananthakrishnan, Suresh Sundaram, A. G. Ramakrishnan, "Dynamic space warping of strokes for recognition of online handwritten characters," IJPRAI, Vol. 23(5): pp; 925-943, DOI: [10.1142/S0218001409007375](https://doi.org/10.1142/S0218001409007375), Aug. 2009.
- J25. Peeta Basa Pati and A. G. Ramakrishnan, "Word Level Multi-script Identification", Pattern Recognition Letters, 2008, Vol. 29, pp. 1218-1229.
- J26. M D Livera, B Priya, A Ramesh, P N Suman Rao, V Srilaxmi, M Nagapoornima, A G Ramakrishnan, M Dominic and Swarnarekha, "Spectral analysis of noise in the neonatal intensive care unit," Indian JI. of Paediatrics, March 2008, Vol. 75, No. 3, pp. 217-222.
- J27. R S Umesh, A G Ramakrishnan, R Srikanth, R Hema, S Divya, "Polarization rich continuous wave direct imaging: modeling and visualization", Applied Optics, June 2006, Vol. 45, No. 18, pp. 4344-4354.
- J28. R Srikanth, A G Ramakrishnan, "Wavelet-based Estimation of Hemodynamic Response Function from fMRI data", International Journal of Neural Systems, World scientific publishing company, April 2006, Volume 16, No. 2, pp. 125-138.
- J29. M V S Phani Narasimham and A G Ramakrishnan, "An Efficient Wavelet VQ Coder for ECG", Medical & Life Sciences Engineering, Vol. 15, Jan. 2006, pp. 13-19.
- J30. R.Srikanth, A.G.Ramakrishnan, "Contextual Encoding in Uniform and Adaptive Mesh-based Lossless Compression of MR Images", IEEE Trans. Medical Imaging, Sept. 2005, Vol 24, Issue 9, pp. 1199 – 1206.
- J31. P B Pati and A G Ramakrishnan, "OCR in Indian scripts: A Survey," IETE Technical Review, May-Jun 2005, 22(3):217 – 227.
- J32. R. Muralishankar and A. G. Ramakrishnan, "Pseudo Complex Cepstrum using Discrete Cosine Transform", International Journal of Speech Technology, 2005, Vol. 8, pp. 181-191.
- J33. R Muralishankar, A G Ramakrishnan and P Prathibha," Modification of Pitch using DCT in the Source Domain," Speech Communication, 2004, Vol. 42/2, pp. 143-154.
- J34. Jagadisha, BN Gangadhar, N Janakiramiah, K Girish, AG Ramakrishnan, "Post-seizure EEG fractal dimension and spectral power predict antidepressant response to unilateral ECT," Indian Journal of Psychiatry, 2003, vol. 45(1), pp. 16-20.
- J35. K. N. Bhanuprakash, A. G. Ramakrishnan, S. Suresh, and Teresa W. P. Chow, "Fetal lung maturity analysis using ultrasound image features", IEEE Trans. Inf. Tech. Biomedicine, March 2002, Vol. 6, Issue 1, pp. 38-45.
- J36. D Dhanya, A G Ramakrishnan & P B Pati, "Script Identification in printed bilingual documents," Sadhana, Feb 2002, Vol. 27, part-1, pp.73-82.
- J37. K. N. Bhanuprakash, A. G. Ramakrishnan, S. Suresh, and Teresa W. P. Chow, "An investigation into the feasibility of fetal lung maturity prediction using statistical textural features", Ultrasonic Imaging, 2001, Vol. 22, No. 1, pp. 39-54.
- J38. G Sita and AG Ramakrishnan, "Wavelet domain nonlinear filtering for evoked potential signal enhancement", Computers and Biomed. Research, 2000, 33, pp. 431-446.
- J39. I. Rajan, P. J. Naga Venkatesha Murthy, A. G. Ramakrishnan, B. N. Gangadhar and N. Janakiramaiah, "Heart rate variability as an index of cue reactivity in alcoholics," Biological Psychiatry, 1998, Vol. 43, pp. 544-546.
- J40. P. Raghuraj, A. G. Ramakrishnan, H. R. Nagendra, and Shirley Teles, "Effect of two selected yogic breathing techniques on heart rate variability," Ind. J. Physiol. Pharmacol., 1998, Vol. 42, No. 4, pp. 467-472.
- J41. A. G. Ramakrishnan and S. Saha, "ECG coding by wavelet-based linear prediction," IEEE Trans. Biomed. Eng., Dec. 1997, Vol. 44, No. 12, pp. 1253-1261.

- J42. M. S. Jayaprakash, A. G. Ramakrishnan, P. J. N. V. Murthy, B. N. Gangadhar and N. Janakiramaiah, "Subclinical autonomic neuropathy in alcoholics: Decreased heart rate variability," NIMHANS Journal, July 1997, Vol. 15, No. 3, pp. 219-223.
- J43. A. G. Ramakrishnan and Supratim Saha, "ECG Compression by multirate processing of beats," Computers & Biomed. Res., Oct 1996, Vol. 29, pp. 407-417.
- J44. A. G. Ramakrishnan and T. M. Srinivasan, "Electrophysiological Correlates of Hanseniasis," International Journal of Leprosy, Sept. 1995, Vol. 63, No.3, pp. 395-408.

Book Chapters

- BC1. R S Umesh, Peeta Basa Pati and A G Ramakrishnan, "Design of a bilingual Kannada-English OCR", in the book "Guide to OCR for Indic Scripts: Document Recognition and Retrieval" published Oct 2009 by Springer in the Advances in Pattern Recognition Series. Ed: Venu Govindaraju and Setlur Srirangaraj. ISBN: 978-1-84800-329-3
- BC2. Deepak Kumar and A G Ramakrishnan, "Segmentation of scene and born-digital word images for improved text recognition," Invited Chapter in the book, "Visual Text Interpretation - Algorithms and Applications in Scene Understanding and Document Analysis", to be published by Springer in the Advances in Computer Vision and Pattern Recognition Series, 2020.

Appendix III: LIST OF CONFERENCE PUBLICATIONS

Conference Papers published during the period under review

- C1. Panachakel Jerrin Thomas, A G Ramakrishnan, K P Manjunath, "VR Glasses based Measurement of Responses to Dichoptic Stimuli: A Potential Tool for Quantifying Amblyopia?", accepted for online oral presentation, IEEE EMBC 2020, Montreal, Canada, July 2020.
- C2. A G Ramakrishnan, A Adarsh, "R-wave Amplitude Changes and Atypical Heart Rate Changes Accompanying Breath Hold During Low Breathing Rates", accepted for online oral presentation, IEEE EMBC 2020, Montreal, Canada, July 2020.
- C3. Jerrin Thomas Panachakel, A G Ramakrishnan, K P Manjunath, "A Pilot Study on Amblyopic Children for Possible Quantification of the Left/Right Mismatch," accepted for online oral presentation, International Conference on Electronics, Computing and Communication Technologies (CONECCT 2020) , July 2020.
- C4. Angarai Ganesan Ramakrishnan, A Adarsh, Kanishka Sharma, Kumar G Pradeep, "Anomaly in respiratory sinus arrhythmia – multiple heart rate variability cycles within each breathing cycle at low breath rates with breath holds," accepted for online oral presentation, International Conf. on Electronics, Computing and Communication Technologies (CONECCT 2020) , July 2020.
- C5. Amit Meghanani, A G Ramakrishnan, "Pitch-synchronous discrete cosine transform features for speaker identification," Proc. 9th International Conference on Pattern Recognition Applications and Methods (ICPRAM 2020), Valletta, Malta, Feb. 2020.
- C6. Sastry, R V; Karthik, S; Adithya, R; Ravi, Aravind; Indrapriyadarsini, S; Panwar, Gagandeep; Ramakrishnan, A G, "Calibration-free SSVEP-based BCI Switch," Proc. IEEE INDICON, Dec. 2019.
- C7. Panachakel, Jerrin Thomas; Ramakrishnan, A G; Ananthapadmanabha, T V, "Decoding Imagined Speech Using Wavelet Features and Deep Neural Networks," Proc. IEEE INDICON, Dec. 2019.

- C8. Nazreen, P M; Ramakrishnan, A G, "Improving generalization of Monte Carlo dropout based DNN ensemble model for speech enhancement and results on real world, traffic noise," Proc. IEEE INDICON, Dec. 2019.
- C9. A G Ramakrishnan, A Madhavaraj, "Language Technology Research at MILE Laboratory," Proc. Language technology for all (LT4all), UNESCO, Paris, France, Dec. 2019.
- C10. A G Ramakrishnan, "Achieving the Goal of Language Technology for All," Proc. Language technology for all (LT4all), UNESCO, Paris, France, Dec. 2019.
- C11. Pandey, Ram Krishna; Ramakrishnan, A G; Karmakar, Souvik, "Effects of Modifying the Input Features and the Loss Function on Improving Emotion Classification," Proc. IEEE TENCON 2019.
- C12. Madhavaraj Ayyavu and A G Ramakrishnan, "Scattering transform inspired filterbank learning from raw speech for better acoustic modeling," Proc. IEEE TENCON, 14-18 Oct. 2019, Cochin.
- C13. Ram Krishna Pandey, Souvik Karmakar, A G Ramakrishnan, and N Saha, "Augmenting Facial Emotion Recognition Systems by Recruiting Crucial Feature Extractors," Proc. 20th International Conference on Image Analysis and Processing (ICIAP-2019), Trento, Italy, 9-13 September, 2019.
- C14. Ram Krishna Pandey, , A G Ramakrishnan, and , "Improvement of Image Denoising Algorithms by Preserving the Edges," Proc. 18th International Conference on Computer Analysis of Images and Patterns (CAIP2019), Salerno, Italy, 3-5 Sept. 2019.
- C15. Anoop C S, A G Ramakrishnan, "Automatic Speech Recognition for Sanskrit," Proc. Second International Conference on Intelligent Computing, Instrumentation and Control Technologies, (ICICT-2019), Kannur, Kerala, July 2019.
- C16. Ram Krishna Pandey, A G Ramakrishnan, "Improving the Perceptual Quality of Document Images Using Deep Neural Network," Proc. 16th International Symposium on Neural Networks (ISNN 2019), Moscow, Russia, July 10-12, 2019.
- C17. H. R. Shiva Kumar and A. G. Ramakrishnan, "Gamma Enhanced Binarization - An Adaptive Nonlinear Enhancement of Degraded Word Images for Improved Recognition of Split Characters," In Proc. 25th National Conf. on Communication (NCC 2019), IEEE.
- C18. H. R. Shiva Kumar, A. Madhavaraj, and A. G. Ramakrishnan, "Splitting Merged Characters of Kannada Benchmark Dataset using Simplified Paired-Valleys and L-Cut," In Proc. 25th National Conf. on Communication (NCC 2019), IEEE.
- C19. A Madhavaraj, AG Ramakrishnan, "Data-pooling and Multi-Task Learning for Enhanced Performance of Speech Recognition Systems in Multiple Low Resourced Languages," Proc. 25th National Conference on Communications (NCC 2019)
- C20. RK Pandey, N Saha, S Karmakar, AG Ramakrishnan, "MSCE: An edge preserving robust loss function for improving super-resolution algorithms," Proc. 25th International Conference on Neural Information Processing (ICONIP 2018).
- C21. Ram Krishna Pandey, Samarjit Karmakar and A G Ramakrishnan, "Computationally Efficient Approaches for Image Style Transfer," Proc. INDICON 2018.
- C22. A Madhavaraj, TV Ananthapadmanabha, AG Ramakrishnan, B Pradeep, "Discrimination of Sonorants from Fricatives Using a Scalar Feature Derived from Linear Prediction Coefficients," Proc. 15th Edition of the IEEE India Council International Conference (INDICON 2018)
- C23. P M Nazreen and A G Ramakrishnan, "DNN Based Speech Enhancement for Unseen Noises Using Monte Carlo Dropout," Proc. 12th International Conference on Signal Processing and Communication Systems, Australia, ICSPCS'2018.
- C24. A Madhavaraja, HR Shiva Kumar, AG Ramakrishnan, "Online speech translation system for Tamil," Proc. 19th Annual Conference of International Speech Communication Association, Sept. 2018.

- C25. TV Ananthapadmanabha, AG Ramakrishnan, "Estimation of the Vocal Tract Length of Vowel Sounds based on the Frequency of the Significant Spectral Valley," Proc. 19th Annual Conference of International Speech Communication Association, Sept. 2018.
- C28. K. V. Vijay Girish, A G Ramakrishnan, Neeraj Kumar, "A system for distributed audio classification using sparse representation over cloud for IOT," Proc. 10th International Conf. Communication Systems & Networks (COMSNETS 2018), Jan. 3-7, 2018.
- C29. A G Ramakrishnan, Gireesh Krishnan, S Srivathsan, "Voice activity detection from the breathing pattern of the speaker," Proc. 14th IEEE India Council International Conference (INDICON 2017), IIT Roorkee, Dec. 15-17, 2017.
- C30. A Madhavaraj, A G Ramakrishnan, "Design and development of a large vocabulary, continuous speech recognition system for Tamil," Proc. 14th IEEE India Council International Conference (INDICON 2017), IIT Roorkee, Dec. 15-17, 2017.
- C31. Ram Krishna Pandey, Shishira R Maiya, A G Ramakrishnan, "A new approach for upscaling document images for improving their quality," Proc. 14th IEEE India Council International Conference (INDICON 2017), IIT Roorkee, Dec. 15-17, 2017.
- C32. P M Nazreen, A G Ramakrishnan, Prasanta Kumar Ghosh, "A Joint Enhancement-Decoding Formulation for Noise Robust Phoneme Recognition," Proc. 14th IEEE India Council International Conference (INDICON 2017), IIT Roorkee, Dec. 15-17, 2017.
- C33. TV Ananthapadmanabha, AG Ramakrishnan, S Sharma, "An objective critical distance measure based on the relative level of spectral valley," Proc. 17th Annual Conference of the International Speech Communication Association (INTERSPEECH 2017), Stockholm, Sweden, Aug. 20-26, 2017.
- C34. K V Vijay Girish, A G Ramakrishnan and T V Ananthapadmanabha, "Cosine similarity based dictionary learning and source recovery for classification of diverse audio sources," Proc. 13th International IEEE India Conference (INDICON 2016), Bangalore, India, Dec. 16-18, 2016.
- C35. K V Vijay Girish, Veena Vijai and A G Ramakrishnan, "Relationship between spoken Indian languages by clustering of long distance bigram features of speech," Proc. 13th International IEEE India Conference (INDICON 2016), Bangalore, India, Dec. 16-18, 2016.
- C36. RVS Sastry, R Aravind, G Panwar, S Indrapriyadarsini, AG Ramakrishnan, "Automatic User Customized Design Approach to a Brain Switch," Proc. 13th International IEEE India Conference (INDICON 2016), Bangalore, India, Dec. 16-18, 2016.
- C37. Nazreen P.M., A.G. Ramakrishnan and Prasanta Ghosh, "A class-specific speech enhancement for phoneme recognition: a dictionary learning approach", Proc. 16th Annual Conference of the International Speech Communication Association (INTERSPEECH 2015), San Francisco, CA USA, Sept. 8-12, 2016.
- C38. K V Vijay Girish, A.G. Ramakrishnan and T V Ananthapadmanabha, : Hierarchical classification of speaker and background noise and estimation of SNR using sparse representation", Proc. 16th Annual Conf. of the International Speech Communication Association (INTERSPEECH 2015), San Francisco, CA USA, Sept. 8-12, 2016.
- C39. Rijul Saurabh Soans, A G Ramakrishnan, V P Shenoy, Ramesh R Galigekere, "Classification of bacterial morphotypes from images of ZN-stained sputum-smears towards diagnosing drug-resistant TB", Proc. SPCOM 2016, June 12-15, 2016.
- C40. A P Prathosh, A G Ramakrishnan and T V Ananthapadmanabha, "Classification of place-of-articulation of stop consonants using temporal analysis, " Proc. 16th Annual

- Conference of the International Speech Communication Association (INTERSPEECH 2015), Dresden, Germany, Sept. 6-10, 2015.
- C41. P Sujith, AP Prathosh, AG Ramakrishnan and PK Ghosh, "An error correction scheme for GCI detection algorithms using pitch smoothness criterion, " Proc. 16th Annual Conference of the International Speech Communication Association (INTERSPEECH 2015), Dresden, Germany, Sept. 6-10, 2015.
 - C42. A G Ramakrishnan, RD Sequiera, SS Rao, Shiva Kumar, H R, "Transliteration of Indic languages to Kannada with a user-friendly interface," Proc. IEEE International Advance Computing Conference (IACC), 2015, pp. 998-1001.
 - C43. Rohan Kumar Das, Abhiram B, S R Mahadeva Prasanna and A G Ramakrishnan, "Combining source and system information for limited data speaker verification," Proc. 15th Annual Conference of the International Speech Communication Association (INTERSPEECH 2014), Singapore, Sept. 14-18, 2014.
 - C44. Rajaram B S R, Shiva Kumar H R and A G Ramakrishnan, "MILE TTS for Tamil for blizzard challenge 2014," Proc. Blizzard Challenge Workshop, Singapore, Sept. 19, 2014.
 - C45. Bhanuprakash Abhiram, Prathosh A P, A G Ramakrishnan, "A fast algorithm for speech polarity detection using long-term linear prediction, " Proc. Tenth International Conference on Signal Processing and Communications (SPCOM 2014), Bangalore, July 22-24, 2014.
 - C46. Vikram R L, K V Vijay Girish, Harshavardhan S , A G Ramakrishnan and T V Ananthapadmanabha, "Subband analysis of linear prediction residual for the estimation of glottal closure instants, " Proc. ICASSP 2014, Florence, Italy, May 4-9, 2014.
 - C47. A Madhavaraj, A G Ramakrishnan, H R Shiva Kumar, Nagaraj Bhat, "Improved recognition of aged Kannada documents by effective segmentation of merged characters," Proc. Tenth International Conference on Signal Processing and Communications (SPCOM 2014), Bangalore, July 22-24, 2014.
 - C48. Bhargava Urala K, A G Ramakrishnan, Sahil Mohamed, "Recognition of open vocabulary, online handwritten pages in Tamil script," Proc. Tenth International Conf Signal Processing and Communications (SPCOM 2014), Bangalore, July 22-24, 2014.
 - C49. Shiva Kumar H R, Ashwini J K, Rajaram B S R and A G Ramakrishnan, "MILE TTS for Tamil and Kannada for blizzard challenge 2013," Proc. of Blizzard Challenge Workshop, Barcelona, Spain, Sept. 3, 2013.
 - C50. Pedamalli Saikrishna, Ramakrishnan AG, "Script independent detection of bold words in multi font-size documents," Proc. National Conference on Computer Vision, Pattern Recognition, Image Processing and Graphics (NCVPRIPG-2013), IIT Jodhpur, Dec. 18-21, 2013.
 - C51. A. G. Ramakrishnan and Bhargava Urala, "Global and local features for recognition of online handwritten numerals and Tamil characters," ACM - Proc. International Workshop on Multilingual OCR, (MOCR 2013), Washington DC, USA, 24 Aug. 2013.
 - C52. Deepak Kumar, M. N. Anil Prasad and A. G. Ramakrishnan, "Multi-script robust reading competition in ICDAR 2013," ACM - Proc. International Workshop on Multilingual OCR, (MOCR 2013), Washington DC, USA, 24 Aug. 2013.
 - C53. Deepak Kumar, M. N. Anil Prasad and A. G. Ramakrishnan, "NESP: Nonlinear enhancement and selection of plane for optimal segmentation and recognition of scene word images," Proc. International Conference on Document Recognition and Retrieval (ICDARR) XX, San Francisco, CA USA, 5-7 Feb. 2013,.

- C54. Deepak Kumar, M. N. Anil Prasad and A. G. Ramakrishnan, "Evaluation of document binarization using eigen value decomposition," Proc. International Conference on Document Recognition and Retrieval(DRR) XX, San Francisco, CA USA, 5-7 Feb. 2013.
- C55. Vikram Ramesh Lakkavalli, K V Vijay Girish and A G Ramakrishnan, "Sub-band envelope approach to obtain instants of significant excitation in speech," Proc. 18th National Conference on Communications (NCC 2012), Kharagpur, 2012.
- C56. Suresh Sundaram, Bhargava Urala K and A. G. Ramakrishnan, "Language models for online handwritten Tamil word recognition," Proc. Workshop on Document Analysis and Recognition (DAR 2012), IIT Bombay, Mumbai, 16 Dec. 2012.
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