



IETE Bengaluru Magazine

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From the President's Desk

It gives me immense pleasure to note that IETE Bengaluru Centre has initiated and successfully published the 7th edition of its quarterly magazine to give an overview of the technical programmes and other related activities conducted by the Centre and also to emphasize its achievements and accomplishments in the service of IETE members and its future endeavors to keep up the charter of the Institution.

IETE Bengaluru has always been one of the most vibrant and active centers of IETE committed towards taking ahead the objective of the institution. The centre, from time to time, conducts various Seminars, Symposia and Conferences on latest scientific and technical themes to help its members avoid technological obsolescence and to grow in their profession. The Centre planned to conduct an International Conference this year in the month of May. However, it is unfortunate that due to the persisting pandemic, the Centre could not hold the Conference and the same is postponed till the situation becomes normal.

IETE HQ has always appreciated and encouraged all proposals of its centres in the quest of sharing and knowledge.

I congratulate the Chairman, Executive Committee Members and Editorial Team of IETE Bengaluru Centre on the successful release of this magazine.

Prof (Dr) J W Bakal

President, IETE



From the Chairman

Dear IETE Members,

Your Magazine is being placed before you once again after an unusually long interval. This is the seventh volume and the first this year. The Executive Committee 2020-22 assumed charge on 28th June 2020 and, in a sense, it is their first offering too.

Covid 19 was, to an extent, responsible for the delay in the publication. After mid-March there have been no physical meetings and technical activities that require hands-on practice, but we have kept up the pace with online activities. In fact, the frequency of activities in the form of webinars has only increased. This is reflected in the pages of the Magazine. IETE's mission is to promote the cause of advancement of Science & Technology. We will ramp up our activities in this direction. IETE never sleeps.

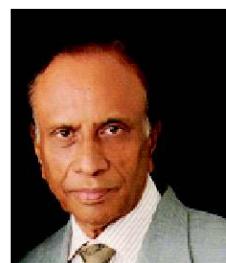
I am happy that the **IETE Bengaluru Magazine** is being released on Independence Day by our President Dr. JW Bakal, who has been elected to lead us for another term. This is an occasion to congratulate him and thank him for his presence in virtual mode.

The Magazine is but one platform for us all to exchange ideas and views. Please make it an effective one. Send us technical articles and brief reports on activities of the institutions you belong to that are relevant to IETE's mission. I appeal to all to come forward with their contributions, comments and criticism.

My best wishes on the Independence Day.

C Satyanandan

Chairman, IETE Bangalore



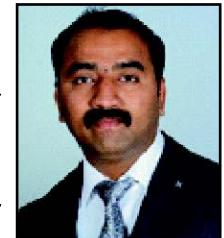
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IETE BENGALURU



From Hon. Secretary



It is my immense pleasure that we are back with the seventh issue of the IETE Bangalore magazine. The last issue was during October – December 2019 and the current issue is being released by newly formed Executive Committee on a special day i.e., 74th Independence Day of India.

As quoted by John F. Kennedy, “*Change is the law of life. And those who look only to the past or present are certain to miss the future*”, Novel approaches and strategies are being adopted to meet the vision of

the IETE Bangalore Centre amidst the current pandemic crisis of Covid’19. The responsibility of carrying over the IETE Bangalore activities is now on the shoulders of the new executive committee and planning of activities has been taken up with new aspirations and teamwork.

The Magazine has been very instrumental in showcasing all the good work that we have been doing and exhibiting innovative technical articles which can pave the way to new research trends with the involvement of all the members and well-wishers of our Institute in all our activities.

I, request all the readers to kindly through the magazine and contribute their innovative ideas, articles and provide their valuable feedback to improve the magazine.

Dr. S G Shivaprasad Yadav

Honorary Secretary



Welcome to Seventh Issue of *iете Bengaluru Magazine!*



We are back after a small break. In this issue we are continuing with the basic framework we have envisioned for this magazine – to record and inform the activities at the IETE Bangalore Centre, introduce the people behind these activities, inform about the proposed upcoming events and activities, include some technical articles and trace some technical trends.

IETE Bangalore Magazine would like to congratulate and welcome the new IETE Bangalore Chairman Mr C Satyanandan and all the Executive Committee Members of IETEB. We are confident that under the stewardship of the new Chairman and EC, Bangalore centre will continue to organize many technical programs and your Magazine will continue to report these programs.

In this issue, in addition to the regular features, we have included a report of the talk given by Prof Ram Narayanan, Pennsylvania State University USA and also two technical articles by Dr Swetha Amit & Dr. Viswanath Talasila.

After IETE successfully organized First IETE International Conference India – IICI-2018 – in Dec 2018, IETEB is planning to organize the Second IETE International Conference India - IICI 2020 – in Nov 2020 and the theme of this conference is “AI & ML Driving 5G”. Due to Covid-19, this IICI-2020 will be an On-line Conference. Many international experts in these domains are expected to participate and give invited talks.

We would like to thank Dr Ram Narayanan (& Mr Satyanandan who has summarized his talk), Dr Swetha & Dr Viswanath for their technical articles. Our thanks are always due to Prof (Dr) J W Bakal, President IETE for his constant support & blessings.

The Editorial Board of IETEB Magazine has been reconstituted. We would like to thank all the outgoing members of the previous board and welcome the new members. Thanks to all members of IETB Magazine Editorial Board for contributions in bringing out this issue.

Thanks for your support and encouragement. Please send your views, suggestions and also be part of the magazine by contributing articles, news clips etc.

Thank You

Dr M H Kori

On behalf of *iete Bengaluru Magazine* Editorial Board

IETE Bengaluru Magazine Editorial Board: Dr. MH Kori, Editor-in- Chief, Sri. C Satyanandan - Chairman, Magazine Committee Sri Ranjeet Kumar, Chairman, Finance Committee Dr. S Mohan Kumar, Member	Dr. S G Shivaprasad Yadav, Convener Dr. CV Ravishankar, Member Dr. E Kavitha, Member
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IETE Bangalore Executive Committee 2020-22

Sl. No	Name	Designation
1	Sri. C Satyanandan	Chairman
2	Prof. H S Bhatia	Imdt. Past Chair
3	Dr. S G Shivaprasad Yadav	Hon. Secretary
4	Sri. Ranjeet Kumar	Hon. Treasurer
5	Sri. C P Dwivedi	Vice Chairman
6	Dr. C V Ravishankar	Vice Chairman
7	Sri. K S Ravi	EC Member
8	Dr. E Kavitha	EC Member
9	Dr. S Mohan Kumar	EC Member
10	Sri. R Prakash	EC Member
11	Dr. Balaji Rajendran	EC Member
12	Dr. G K Venkatesh	Co-opt Member
13	Sri. B N Jagannath Rao	Co-opt Member
14	Dr. D G Rao	Co-opt Member
15	Dr. Puneet Kumar Mishra	Co-opt Member
16	Dr. K Shrishail Angadi	Co-opt Member
17	Dr. M H Kori	Special Invitee
18	Prof. C Murali	Special Invitee
19	Sri. G L GangaPrasad	Special Invitee
20	Sri. Vinay Avanchi	Special Invitee
21	Dr. D C Pande	Governing Council Member
22	Sri. G Ramesh	Governing Council Member

Congratulations & Best Wishes to New Chairman & Executive Committee



iici-20



IETE INTERNATIONAL CONFERENCE INDIA-2020 (IICI-2020) **ON** **AI & ML DRIVING 5G & BEYOND** **NOVEMBER, 2020** **ONLINE CONFERENCE** **BENGALURU, INDIA**

IETE is organizing The Second "IETE International Conference India -2020' (iici-20), on "AI & ML DRIVING 5G & BEYOND" in November 2020, On-line. This conference attempts to highlight the technological developments in 5G with emphasis on the critical role of Artificial Intelligence and Machine Learning in efficient design of 5G & Beyond Networks.

Please contact: Dr M H Kori, iici-20 co-ordinator, at mhkori@gmail.com

AN EVENTFUL QUARTER

Technical Activities:

1. A One-month (4-week) Internship Program for Engineering students and training on IoT was organized from **13th January 2020 to 7th February 2020**. The objectives of the program were to introduce IoT technology, to provide hands-on and exposure to industry in the area of IoT with an evaluation at the end to judge how much they have learnt. The program was organized by Course Director Shri. Ganga Prasad, Vice Chairman, IETE Bangalore. It included lectures and three industry visits. 30 students attended the course.

Following are some of the features of the program.

The course covered in detail the basics of IoT, Relevance to the societal applications, HR perspective of job requirements on IoT, Hardware & Software Architecture, Development and Application framework, Industry based real application case studies.

The course also included four industrial visits to understand how the IoT based application development takes place, how IoT technology is applied to real life application through live demonstrations like Drinking Water Distribution, Courier service management and Medical application. There were a series of Guest lectures on advanced topics on IoT like Security, Digital twins, Home automation and Industrial IoT (IIoT)

Detailed interaction with industry experts on possible future projects connected with IoT helped the students greatly. They were also extensively exposed to laboratory sessions every day. At the end an examination was conducted and qualifying students were awarded IETE Certificates.

The Internship program concluded with a valedictory function on 7th February 2020. It was presided over by Chairman Prof. Bhatia and certificates were distributed by Chief Guest Dr. Balasubramanya Murthy, Chairman, BITES, and Guest of Honour Dr. Sathya Rao from Swedish Telecom. Sri. C Satyanandan, Hon. Secretary proposed the vote of thanks.



2. **02 Feb 2020 to 08 Mar 2020:** A Six-Sundays course on IoT and Augmented Reality (AR) was conducted. 14 students from DEBEL, ISRO, Professors from Gitam University, Delegates from Private Industry and Engineering students from various institutions participated in the practice oriented course conducted by Shri. G Avinash, Lead Architect, PTC Inc.. Sri. Avinash covered sessions on IoT Overview, IoT for tomorrow, IoT connectivity, data modeling and Augmented Reality. The course duration was 6 Sundays and it was the first such course conducted by IETE Bangalore.

Sri.C P Dwivedi, Vice Chairman and Sri. C Satyanandan, Hon. Secretary distributed the participant certificates.



3. Short Term Courses

- i. 02-08-2019: Embedded Systems & Design short term course was started by Sri. Malhar Deshpande at IETE Bangalore.
- ii. 28-08-2019: Sri. Malhar Deshpande conducted a one day hands on workshop on Embedded Systems & Design at Reva University for the benefits of student's community and faculty members.
- iii. 01-09-2019: A Short term Course on Advanced FPGA Design was started. The course was conducted by Sri. Anil Kumar TS.
- iv. 08-09-2019: Prof. S G ShivaprasadYadav started a weekend course on MATLAB/SIMLINK at IETE Bangalore Centre.
- v. 12 Jan 2020 to 01 Mar 2020: Embedded Systems & Design course was conducted by Sri. Malhar Deshpande, FIETE. Students joined from LRDE, Private Industries and Students from various engineering colleges. As usual this course was conducted on only Sundays for 10 weekends. End of the course participants and course materials in CD's form were distributed to all the students.

Celebrations:

- i. **26-01-2020: Republic Day 2020** was celebrated. Flag Hoisting was done at 10 am by the Guest of Honour Dr. PV Ananda Mohan, Editor-in-Chief, IETE Journal of Education. Members met afterward over breakfast, exchanged Republic Day greetings and engaged in a lively interaction.



- ii. **15-02-2020: IETE Bangalore's Student Day, 15th Feb. 2020.**

Technical and General Knowledge Quiz, Technical Talk and Tech. Charade were the highlights of the celebration. Shri.Satyanandan, Hon. Secretary read out the Student Day Message from Dr. JW Bakal, President IETE. Coordinators of the event Dr. Ravishankar and Dr. GK Venkatesh both

Executive Committee members spoke. Prof. HS Bhatia Chairman presided and certificates and cash prizes were distributed to participants and winners of the competitions.



- iii. **28-2-2020: National Science Day 2020 was celebrated.**

Prof. PM Soundara Rajan Scientist (Retd.) DRDO & Prof. at NIAS was the Chief Guest who delivered the 24th Sir CV Raman Memorial Lecture. Shri.Jidhu Mohan, Lead Research Engineer, Siemens R&D, Bangalore was the Guest of Honour; he delivered a talk on "The Intelligent Edge –Next Generation IoT"

Shri. Gangaprasad, Vice Chairman welcomed the gathering and introduced the Chief Guest. Shri.Satyanandan, Hon. Secretary conducted the proceedings, and also introduced the Guest of Honour. He welcomed on stage students from Sambhram College, who had won a prize in the State Level Project Competition. Dr. CV Ravishankar, the HoD, E & C at Sambhram College as well as the students were felicitated.

Prof. HS Bhatia Chairman gave the Presidential Address and honoured the Guests with mementos. Shri. KS Ravi, Member EC proposed the Vote of Thanks.



- iv. **17-5-2020: World Telecommunication & Information Society Day 17th May 2020** was observed. The theme of the year was "Connect 2030: ICTs for the Sustainable Development Goals (SDGs)"

Celebrations were held as a WEBINAR for the first time. Shri. Sachin Arora, Head of Analytics, AI and Big Data at KPMG was the Chief Guest.

In his Theme Lecture Shri. Arora started off with how we have seen in history that man becomes stronger during hard times only to eventually create good times for himself and then becomes weak again, going back to hard times. Thus, he indicated that technology (Information Communication Technology) should be used to help humans remain strong through tough and good times equally, thereby averting any potential dangers or a recurrence of hard times.

The function started with a welcome address by Dr. CV Ravishankar, EC Member who hosted the web program. Shri. GL Gangaprasad, Vice Chairman read out the ITU Secretary General's message on WT & IS Day. Dr. Shrishail Angadi, Jt. Secretary read out the message of Dr. Bakal, President IETE. Shri. Satyanandan, Hon. Secretary introduced Shri. Sachin Arora, Chief Guest and Shri. Jagannatha Rao, Hon. Treasurer proposed the Vote of Thanks.



IETE Students Forum (ISF) Activities:

1. **03 Feb 2020 to 05 Feb 2020:** IETE –Students Forum (ISF) of Sambhram Institute of Technology in association with Dept of ECE and M/s. Advanced Electro systems Bangalore is organized a three day FDP on Microcontroller and Embedded system- ARM7TDMI / LPC2148 from 3rd to 5th Feb. 2020. The Chief guest and resource person was Prof. Harish V Mekali, Assistant Professor, BMSCE, Presided by Dr. C V Ravishankar, HOD-ECE. The hands-on sessions focused on ARM7TDMI /

LPC2148 kits carried out by Mr. Raghavendra from Advanced Electronic Systems Bangalore. Around 50 faculty members attended from different colleges. The FDP was coordinated by Prof. Anupama and Prof. Trupti.

- 2.. **7th & 8th Feb. 2020:** Sambhram Institute of Technology, Department of ECE in association with IETE Bangalore organized two days' FDP on Research Database Management and Software. The Chief Guest was Sri. B N JagannathaRao, Hon.Treasurer, IETE Bengaluru, Former Scientist U R Rao Satellite Centre Bengaluru. The Resource Person was Dr. C S Ramesh. Dean, Research & Innovation Presidency University Bengaluru and was presided by Dr. C V Ravishankar, HOD-ECE. Carried out by Prof. Ezhilarasan K and Dr. C Rangaswamy. 45 faculty members and research scholars were attended from different colleges.
- 3.. **13-02-2020:** IETE – Students Forum (ISF) of Sambhram Institute of Technology in support of EFY, Bangalore conducted Guest Lecture by Mr. AnandTamboli ,a prolific writer and award winning author of two books who is currently based in Australia. TheProgramwas attended by around 300 students and 70 faculty members. Mr. AnandTambuliwas welcomed and honored by Dr.Ravishankar.C.V., Professor & HOD-ECE.
- 4.. **15-02-2020:** The IETE –Student Forum (ISF) of Sambhram Institute of Technology, with the help of Dr. C.V.Ravishankar, HOD-ECE, arranged an Industry visit to Airforce Electronics Training Institute at Jalahalli East, Airforce, Bangalore. Around 85 students, along with four Faculty members and coordinated by Dr. Rangaswamy visited on 15-02-2020 between 9am to 1pm. The students and faculty updated about latest technologies related equipment's, instruments etc.
5. **22-02-2020:** Sri. C Satyanandan, Hon. Secretary delivered a talk about IETE at NMIT, Bangalore. He spoke about the benefits of ISF and explained in details through a PPT presentation.

Seminars / Lectures conducted online:

1. IETE Bangalore associated itself with Sambhram Institute of Technology Research Centre, Department of ECE to conduct a series of web lectures. Dr. C.V.Ravi Shankar, EC Member-IETE,Bangalore, Professor & HOD-ECE Sambhram Institute of Technology Bangalore coordinated and hosted the lectures.

11-05-2020 to 20-05-2020: A series of Web Lectures were given by Dr. Ravi Shankar on

- i. Work from Home –Employee & Employer Perspective in the general context of COVID19.
- ii. Future Technologies.
- iii. Drones – Trends, Future & Security Issues.
- iv. IOT – Technology, Present, Future & Security issues.
- v. Cyber Security - Issues, Consequences & Future Prospectus
- vi. Block Chain Technology –Crypto Currency & Beyond.

02-06-2020: Dr. DC Pande, Former Associate Director, LRDE & Former Chairman IETE-Bangalore gave a lecture on "Advances in Microwave Technology"

2. **13-06-2020:** Bangalore Institute of Technology, Bengaluru held a webinar in association with IETE Bangalore on "Micro strip Antennas- Future Trends and New Applications" by Dr. Ashutosh Kedar, Scientist F, AAAU Group, Radar Antennas Microwave Division (RAMD), LRDE Bangalore.
3. A Two-week online Faculty Development Program on "Applied Data Science" from **6th to 17th July 2020** was organized by Department of Electronics and Communication Engineering BMS College of Engineering Bangalore in association with IETE, Bangalore Centre.(Report in this Issue)

4. A Five Days Faculty Development Program on "Contemporary Research Trends in Electronics & Communication and Computer Science" from **06th to 10th July 2020** was organized by Centre for Postgraduate Studies, Kalaburagi in association with Visvesvaraya Technological University Belagavi, Karnataka & IETE Bangalore.
5. A Two Days Webinar was conducted by Department of Computer Science & Engineering (CSE), Sri. Venkateswara College of Engineering (SVCE), Bangalore on **11th & 12th July 2020**, in association with IETE Bangalore on Ethical Hacking and Practical uses of it
6. One week Online FDP on "AI and ML Applications in image processing using modern tools" is being organized jointly by the Departments of ETE, ECE and ML, Ramaiah Institute of Technology technically supported by IETE Bangalore Centre from **13th July to 18th July 2020**.
7. Webinar on "Applications of AI, ML and Blockchain in Cyber security" on **15th July 2020** from 11.00 am to 1.30 pm by Dr. Manish Kumar, Assistant Professor, Ramaiah Institute of Technology in association with BrightV and IETE Bangalore.
8. A One week Webinar on "Advanced Antenna Design and Development for RF Communication Systems" was organized by IETE Bengaluru, jointly with ATMS, India during **20th – 25th July 2020**.(Report in this Issue)

Summary of Prof. NS Nagaraja Memorial Lecture on the occasion of AGM 2020 of IETE Bangalore delivered by Prof. Ram M Narayanan

Prof. of Electrical Engineering & Director, Centre for Radar Engineering, Science and Technology (CREST) and Director, State College Area Radio Frequency Consortium (SCARF) at the Pennsylvania State University USA.

- Summarized by Sri C Satyanandan

The topic of the Lecture was "Information Elasticity and Overload in Sensor Systems". Prof. Narayanan dealt on how we can learn via experience and prior knowledge the amount of sensor data just adequate for developing an optimum decision strategy. He looked at the premise DATA = INFORMATION, i.e. the more the data, the more the information, and explored how truthful it is and whether it needs to be tweaked to different applications. He based his talk on an Air force Research Project that he had worked on. He mentioned the Objectives, the Approach, Key Findings, and Benefits to the wider academic or Dept. of Defense community.

The objectives include how to model the utility value of information obtained from a sensor in both quantitative

and qualitative terms, model information overload from a sensor within a specific contextual sense. How can we derive metrics of information elasticity within a specific contextual sense and how can we apply the concept of information elasticity to raw data from individual sensors?

How can we fuse together useful information from an adaptive distributed multi-sensor suite using intelligent agents to address specific contextual goals?

The approach includes Modeling of Information Overload, Modeling of Information Elasticity, Development of Meaningful Sensor Information Metrics and Constraints and Application of Information

Elasticity to Sensor Data.

The key findings are that using different processing methods can change the information elasticity of a system. The decision strategy and context of a system greatly affect the value of information it deals with. Depending on the system, extra information can cause a decrease in decision maker accuracy.

The benefits to the wider academic and DoD community are:

To have a viable approach to dynamically optimize "information" in applications to adaptive distributed multi-sensor detection and recognition tasks.

To be able to design and implement multi-modal and multi-sensor systems and their associated detection architecture to ensure that information overload is avoided.

To find out "How much information is optimal for achieving the objective under a set of circumstances?"

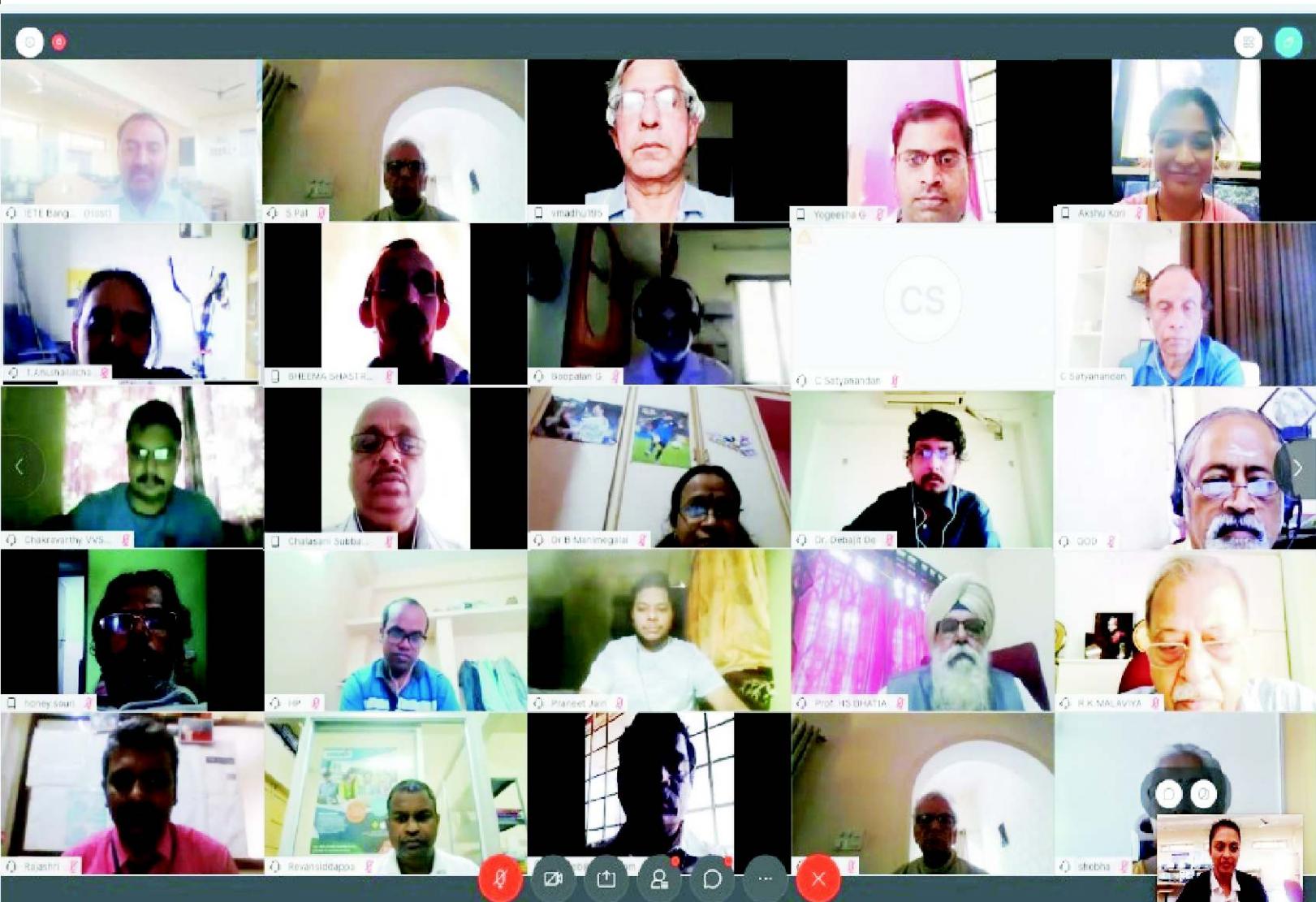
He described some factors associated with Information Overload such as quantity of information, available

time for information processing, information characteristics, information freshness, Task and Process Parameters, personal factors and extraneous factors.

Prof. Narayanan showed by an Inverted U curve with information load on the X-axis and Decision Accuracy on the Y-axis that there is a tipping point beyond which there is information overload. We prefer to be at the tipping point. He described an analysis of placing a Corner Reflector on different types of clutter to maximize the Signal to Clutter Ratio. Initially the SCR increases with increase in percentage of Bandwidth and then there is a tipping point after which there is no benefit. When the percentage of Bandwidth increases, you find more decision effectiveness in the beginning, but over time it drops down. He talked about the Model constraints based on constraining statements.

Prof. Narayanan concluded by saying that more data does not always mean more information.

DATA ≠ INFORMATION.



"Advanced Antenna Design and Development for RF Communication Systems"

Organized by IETE Bengaluru and ATMS, India.
20th – 25th July 2020

A One week Webinar on "Advanced Antenna Design and Development for RF Communication Systems" was organized by IETE Bengaluru, jointly with ATMS, India during 20th – 25th July 2020. Lectures were delivered by many well-known domain experts. Almost 500 members from the Academia, Industry and Defense Organizations participated in this webinar. Dr. S G Shivaprasad Yadav, Hon. Secretary IETE Bangalore and Dr. Swetha Amit, Member, ATMS coordinated this webinar with the support of Shri C. Satyanandan, Chairman, IETE Bangalore and Shri Rajkumar Malaviya, Secretary ATMS.

The webinar began with a formal Inauguration program on 20th July at which the Chief Guest was Dr. Surendra Pal, Former Vice Chancellor, DIAT, Pune, Senior Adviser- ISRO. The Inauguration began with an invocation by Ms. Snigda Sharma, followed by Welcome Address by Dr. Shivaprasad Yadav and Dr. Swetha Amit providing an overview of the Webinar. Chairman IETE Bangalore welcomed the gathering and gave a brief account of the activities of IETE Bangalore. The Guest of Honor for the Inauguration, Shri. Raj Kumar Malaviya, then addressed the gathering and highlighted the various activities conducted by ATMS. He also mentioned the importance of Antennas and RF Communication in the current context.

Dr. Surendra Pal, the Chief Guest in his address narrated the developments that happened from the 1970s till date and showcased the various challenges and difficulties in the domain of RF communication. He also shared the importance of RF and Microwave communication in the current context and the highlighted the need for more youngsters to work in the domain.

The key note address was delivered by Prof. OPN Calla, Director, ICRS who gave a very splendid session on the radiation hazards and the radiation effects on humans. He also gave a complete analogy of radar operations in "sandstorm". He highlighted the complete phase of developments that happened since the 1970s and how the technology transformed to the current advanced technologies.

During the afternoon session Dr. Swetha Amit delivered a talk on "Antenna fundamentals, Design and analysis of Microstrip Antennas". She started with the fundamentals of Antennas, the various parameters used

for the measurement and 50Ω impedance matching. She also demonstrated her experiments and played a few videos to demonstrate how the ripples are generated and spread across the water pool when a stone is thrown. This gave a nice explanation of near field and far field radiation.

On the second day Sri Rajkumar Malaviya delivered his talk on the topic "Microwave Antenna Measurement Technology" wherein he explained the various measurements facilities available on ATMS webpage. He also offered the participants possible collaboration and utilization of facilities on the website for the measurements required to carry out the Research

In the afternoon session, Dr. MH Kori, Distinguished Fellow IETE, Technical Director (Retd.), Alcatel-Lucent Technologies delivered his presentation on 'Antennas for Wireless/ Mobile Communications'. He highlighted the salient features of the generations of Mobile communications and how the limitation of each generation was improved with new modifications or updating on technology. He also emphasized the various challenges and opportunities to be addressed in the area of 5G technology.

On the 3rd day Morning session, Prof Mahadevan, Scientist (R) ISRO and currently Professor at PES University, Bangalore addressed the participants on "Spacecraft antennas". He explained the complete antenna design analysis in Space applications.

In the afternoon, Dr. Swetha delivered her talk on the topic "Challenges in design and analysis of Active and Passive Wearable Antennas" wherein she explained and motivated the students in creating interest on new technology – Wearable antennas. Dr. Swetha shared several case studies of her different research works carried out in the area of wearable antennas, with her team members. She shared several research results and her achievements and contributions to wearable antennas. Many participants were excited and expressed their interest in knowing further details

On the day 4, Dr. B. Manimegalai, Professor, Thiagarajar College of Engineering, Madhurai delivered here talk on the topic "Compact Multiband antennas and Numerical Modelling" wherein she

covered the various research works she had done in the area of multiband antennas and numerical modelling. The concepts of numerical analysis in Matlab which gives a fractal shape and their synthesis was very well discussed.

The afternoon session was delivered by Dr. Malay Ranjan Tripathy, Professor, Amity University Uttar Pradesh, Noida delivered his talk on the topic "Metamaterial based antenna designs and applications: Prospects and Challenges". Metamaterials are the so called negative permittivity and permeability, artificially made structures which exhibit lot of advantages was discussed.

On the 5th day Dr. Swetha Amit talked about a new approach of designing antennas using liquid mode – Liquid antennas and was an interesting talk. She shared several of her research experiments done in the area if liquid antennas, their scope in the current context and various research opportunities possible to be taken by academia and research organizations. She also appealed the participants to have possible collaborations using the facilities and work together in newer problem pertaining to liquid antennas

In the afternoon session another eminent speaker Shri. Kali Shankar Shukla, Retd. Senior Scientist ISRO, delivered his talk on the topic "Topic: Space, Technologies which changed our lives". He was able to explain the technology transformation and various developments which was happening in the area of space technology. He also gave some examples of the significant works he had carried out/ involved in the area of space technology'

On the last day, Dr. Debajit De, Senior RF Engineer, VVDN Technologies Private Limited, Odisha delivered his session on "5G and Beyond" where in he highlighted several advancements which are happening in the area of 5G technologies and research scope for working in this area.

Overall an attempt to give an overview of complete flow of antennas and RF communication was made in this webinar and had well taken by the participants. All the domain experts were able to share their significant contributions to the society and new opportunities for taking up the work. Also all the eminent speakers appreciated the interest of increased numbers of participants in the area of antennas and wished them to carry forward the research works and seek their support if required,

During the valedictory session, Concluding remarks were made by the chairman, IETE Bangalore Shri. C Satyanandan and Shr. Rajkumar Malaviya, secretary ATMS. Both gave an overview of the various technical activities being conducted by the respective professional societies and requested the participants to avail the benefits of these activities by becoming the Members of the societies. Dr. Swetha Amit consolidated the overall outcome of the webinar and how the flow was considered to be covered and thanked all the participants for the cooperation. Finally the Hon. Secretary Dr. S G Shivaprasad Yadav, proposed the Vote of Thanks thanking all the expert members for sharing their expertise and the participants attending the webinar.

Report on the Two-Week Online Faculty Development Programme on 'Applied Data Science'

The Department of Electronics and Communication Engineering of B.M.S. College of Engineering, Bengaluru in association with IETE Bangalore organized a two-week online Faculty Development Programme (FDP) on the topic "Applied Data Science" from 6th to 17th July 2020. The coordinators of the programme were Dr. M. Anantha Sunil and Dr. Rajath Vasudevamurthy, both Assistant Professors in the Dept. of ECE with Dr. Arathi R. Shankar, HOD as the Organizing Chair.

On the first day of the two-week programme, Dr. Arathi R. Shankar welcomed the participants and the dignitaries present for the inauguration. Dr. B. V. Ravishankar, Principal highlighted the significance of

FDP during the COVID situation and motivated the audience to make the best use of the opportunity. The programme was inaugurated by the Chief Guest, Dr. T. S. Mohan, Director & Founder, Pragyan Datalabs, who enlightened the audience about the opportunities in the field of Data Science.

The FDP was financially self-driven and the resource persons were from India's premier institutes such as IISc., IIT Dharwad, IIIT Delhi and from industry who are experts in the field of Data science. There were a total number of 124 participants from engineering colleges across India and polytechnic colleges in engineering disciplines such as Electronics & Communication, Computer Science, Information Science, Electronics &

Instrumentation, Medical Electronics and a few from Mechanical Engineering.

This programme aimed to focus on the fundamentals of data science as well as its application to various domains such as Medical imaging, Computer Vision, Robotics, Neural networks, Social media, Business applications, Materials modeling, etc.

The programme was conducted for 11 days from 6th July to 17th July 2020 on all days barring Sundays between 2:00 and 4:00 PM. The speakers are as follows:

1. 6th July 2020: Dr. Phaneendra K. Yalavarthy, Associate Professor, Dept of Computational & Data Sciences, Indian Institute of Science, Bengaluru spoke on the topic "Medical Image Computing and Analytics: The Road Ahead".

2. 7th July 2020: Dr. Sri Vallabha Deevi, Lead Data Scientist, Tiger Analytics, Chennai spoke on the topic "Machine Learning: Introduction and Applications".

3. 8th July 2020: Dr. Tanmoy Chakraborty, Assistant Professor, Department of CSE, Indraprastha Institute of Information Technology, Delhi spoke on "Data Science for Social Media Analytics: Challenges and Opportunities".

4. 9th July 2020: Mr. Narayan Prasad, Chip Design Professional spoke on the topic "Scene Perception and Path Planning in Autonomous Vehicles".

5. 10th July 2020: Dr. Bharath B. N., Assistant Professor, Department of Electrical Engineering, IIT Dharwad spoke on the topic "Machine Learning for Next Generation Wireless".

6. 11th July 2020: Dr. Dinesh R., Principal Engineer & Development Manager, Samsung Electro-Mechanics, Bengaluru spoke on the topic "Recent Trends in Computer Vision". He highlighted the various emerging applications of computer vision and discussed at length about its specific applications in the field of image processing.

7. 13th July 2020: Ms. Suma Kandkur, Technical Product Manager, Nokia Networks introduced the audience to the various aspects of Data Science and discussed the concepts of supervised and unsupervised learning.

Mr. Rajiv Kumar Ranjan, Solution Architect, Nokia Networks presented some of the case studies where machine learning principles and algorithms were applied to the design and simulation of communication systems.

8. 14th July 2020: Dr. Phani Motamarri, Assistant Professor, Dept of Computational & Data Sciences,

Indian Institute of Science, spoke on "High Performance Computing for Material Modeling Applications".

9. 15th July 2020: Dr. Konduri Aditya, Assistant Professor, Department of Computational & Data Sciences, Indian Institute of Science, Bengaluru spoke on the topic "The Role of ML/AI in High Performance Computing". He suggested that although the computing power is increasing, we need to come up with strategies to exploit the same. In particular, he presented the case studies of anomaly detection (to detect early auto-ignition in engines) and a technique to improve the resolution of a (blurred) image.

10. 16th July 2020: Dr. Pramod P. Udupa, Staff Engineer/Researcher, Samsung Research & Development Institute, Bengaluru spoke on the topic "Evolution of CNN Hardware Accelerator Architectures".

11. 17th July 2020: Mr. Mihir Mody, Distinguished Member of Technical Staff (DMTS), Texas Instruments, Bengaluru spoke on "ADAS/Automated Driving: Computer Vision System and Challenges".



Dr.B.V. Ravishankar, Principal, BMSCE (Left), Dr.T.S. Mohan, Director & Founder, Pragyan Datalabs

On 17th July 2020, the last day of the programme, Mr. Mihir Mody's talk was followed by the valedictory function.

Dr C. Satyanandan, Chairman, IETE Bangalore Centre was the Chief Guest for the valedictory function, presided over by Dr. D. Sheshachalam, Professor & Chairman, Board of Studies, Electrical Sciences Cluster, B.M.S. College of Engineering. Dr. Arathi R. Shankar welcomed the dignitaries and participants. Four participants of the programme came live and gave their feedback about the programme. Dr. Sheshachalam complemented the organizers and encouraged them to take the next step in organizing hands-on sessions in the coming months. Dr. S. G. Shivaprasad Yadav, Hon. Secretary IETE Bangalore thanked the organizers for the opportunity to co-host the programme. ☺r☺

Satyanandan in an audio message congratulated the organisers and participants of the programme on an emerging field such as data science and urged them to continue their association with IETE. The programme was formally concluded with vote of thanks by Dr. M. Anantha Sunil.



Liquid Antennas

Dr. Swetha Amit & Dr. Viswanath Talasila

Faculty,

Department of Electronics & Telecommunication Engineering
M S Ramaiah Institute of Technology, Bangalore

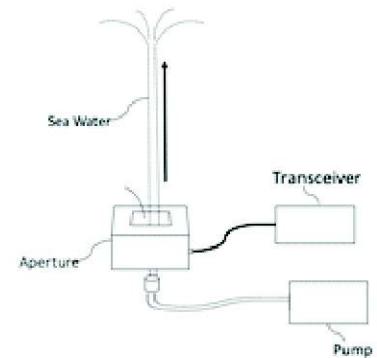
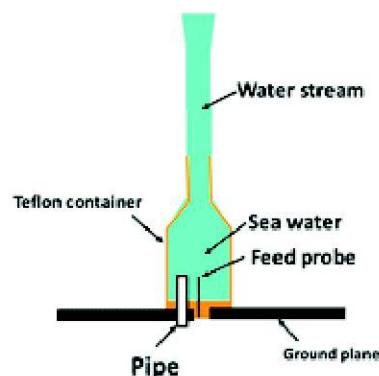
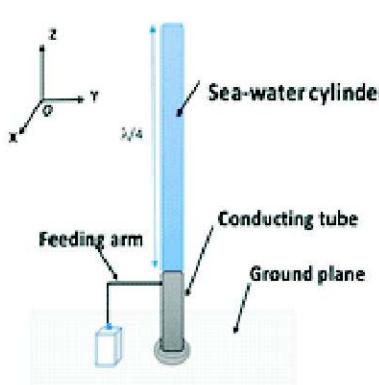
The advancements in wireless communication impose a growing range of demands on the antennas performance, requiring multiple functionalities to be present in a single device. To satisfy these different application needs within a limited space. Reconfigurable antennas are often used which are able to switch between a number of states, providing multiple functions using a single antenna. In recent years, an alternative approach using liquid for antenna reconfiguration has drawn significant attention. The intrinsic conformability of liquid dielectric materials like salt water allows us to realize antennas with desired reconfigurations with different physical constraints while maintaining good radiation efficiency.

Liquid antenna is a type of antenna which utilizes water to transmit and receive electromagnetic signals. There are many advantages with such

antennas like low cost, compact size, conformability; creating antenna to any desired shape, configurability (physical, electrical and chemically). Liquid antennas that depend on salty water have even more benefits, since the substance is readily available, low-cost and eco-friendly. The conductivity of the water-based antenna can be altered by modifying the salinity percentage of the water thus making it reconfigurable in nature.

"More importantly, the antenna can be totally 'turned off' when not in use."

A new antenna that uses liquid and plastic instead of metal to shape radio signals could make it easier to build networks that use VHF and UHF signals. When we know the receiver's location and it will stay put for a while, an energy is thrown in a direction



from the array of liquid antenna at the receiver. Liquid antenna has a low conductivity, so multiple streams of water will help in enhanced range. The conductivity of the water-based antenna can be altered by modifying the salinity percentage of the water thus making it reconfigurable in nature. Also, due to the constraint for liquid to be used as an antenna, it is used as a Dielectric Resonator Antenna (DRA) since liquid has a very high dielectric constant of 81. Using this property in constructing an antenna makes it more efficient, compact size and easy to reconfigure to any size depending on

the frequency of communication. Array antennas help in increased directivity, steering the beam towards mobile receivers, cancel interference in undesired directions, diversity reception. Two or four element array can be used to meet the specifications of 1~2 kilometres line of sight communication. Also, using different liquid antenna setup, the beam can be steered towards the desired receiver direction. The beam steering can be easily implemented by the arrangement of water stream, hence no mechanical or electronic steering is needed. Below figures shows different configurations of Liquid Antenna.



IETE Bangalore congratulates **Prof (Dr) J W Bakal**, on being reelected as President of IETE for the year 2020-2021. Under his leadership IETE has achieved greater heights and has undertaken many significant programs. His support to IETE Bangalore Centre is greatly appreciated and hopes to receive continued help and support in his new term too.

Congratulations to **Dr Govind Rao Doddamani** for receiving the prestigious "**IETE - N V Gadadhar Memorial Award**" for the year **2020-2021** for his significant contributions in the field of Radars.

IETE Bangalore wishes both greater success and many more laurels

Aerial Image Registration

Imagine a scenario where a drone is taking pictures of the river Kaveri (Cauvery). If the objective is to detect an oil spill in all possible environmental conditions, it is not enough if the drone uses a standard visible light camera. The colour of the oil spill may be the same as the river water, there may be cloud interference – which degrade the measurements. To solve this one can use multiple cameras, where each camera can measure a different part of the entire electromagnetic spectrum. The measurements from IR cameras, RADAR and visible light cameras can be combined to present a more accurate and meaningful information. There are other applications, in defence and border security we may need tracking of vehicles in a large geographical region using satellites and drones.

Multiple cameras are usually mounted such that each is looking at a different view of the same object in a scene,

Dr. Viswanath Talasila,

Professor, Department of Electronics & Telecommunication Engineering, M S Ramaiah Institute of Technology, Bangalore

they may even be mounted on two different vehicle platforms. So how can we fuse this multi-sensor information to ensure we can extract (segment) the same object from each camera view - for e.g. can we identify the campus of MSRIT in two different types of images below?



Drone view and satellite view of MSRIT campus (different views, resolutions and scales): how to match MSRIT campus in the two images?

Image registration is a technique that can geometrically align images, and the result is such that the same objects

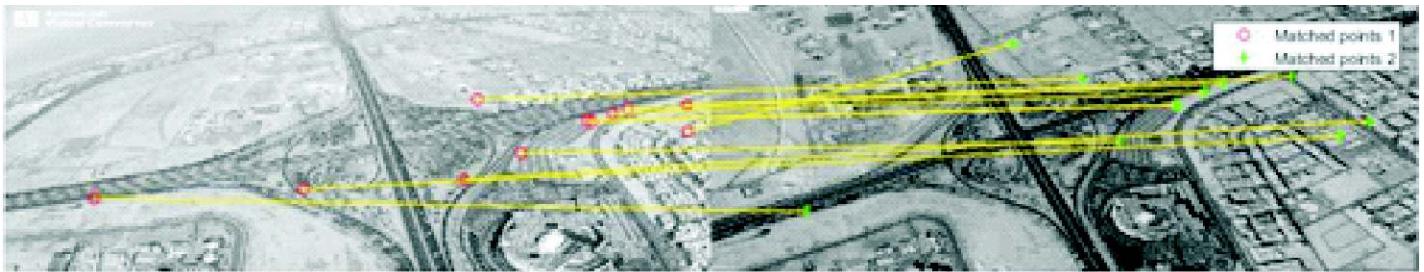


Image registration of a large road intersection across two images (different resolution, view and scale)

can be accurately identified across multiple images taken from different imaging systems. The process for image registration given a pair of images captured from different sensors, generally includes feature detection, feature matching and computation of the transformation (mapping) function between the images pairs.

There are three basic spatial features corners, blobs and edges. Features are classified based on properties such as scale invariance, rotational invariance etc. Given a pair of images and their corresponding features, we compute the (e.g. Euclidean) distance between the feature vectors. If the distance is sufficiently

small, the features are said to be matched across the image pair. Finally, given a bunch of matched features we have to ensure that the matching is robust and accurate. One solution to this is to, using the matched features, compute a transformation matrix (called homography) – homography tries to align the images geometrically. Those pairs of features which result in the best homography matrix are the final set of matched features. The feature set may be very large and it can be computationally expensive to test all feature pair combinations. RANSAC is a technique for randomly selecting feature pairs to compute the homography matrix. The below image pair shows a result of image registration

Tech Trends

Compiled by M H Kori

Unhackable Internet

Later this year, Dutch researchers will complete a quantum internet between Delft and the Hague.

An internet based on quantum physics will soon enable inherently secure communication. A team led by Stephanie Wehner, at Delft University of Technology, is building a network connecting four cities in the Netherlands entirely by means of quantum technology. Messages sent over this network will be unhackable.

In the last few years, scientists have learned to transmit pairs of photons across fiber-optic cables in a way that absolutely protects the information encoded in them. A team in China used a form of the technology to construct a 2,000-kilometer network backbone between Beijing and Shanghai—but that project relies partly on classical components that periodically break the quantum link before establishing a new one, introducing the risk of hacking.

The Delft network, in contrast, will be the first to transmit information between cities using quantum techniques from end to end.

The technology relies on a quantum behavior of atomic particles called entanglement. Entangled photons can't be covertly read without disrupting their content.

But entangled particles are difficult to create, and harder still to transmit over long distances. Wehner's team has demonstrated it can send them more than 1.5 kilometers (0.93 miles), and they are confident they can set up a quantum link between Delft and the Hague by around the end of this year. Ensuring an unbroken connection over greater distances will require quantum repeaters that extend the network.

Such repeaters are currently in design at Delft and elsewhere. The first should be completed in the next five to six years, says Wehner, with a global quantum network following by the end of the decade.

Digital Money

The rise of digital currency has massive ramifications for financial privacy.

Last June Facebook unveiled a “global digital currency” called Libra. The idea triggered a backlash and Libra may never launch, at least not in the way it was originally envisioned. But it’s still made a difference: just days after Facebook’s announcement, an official from the People’s Bank of China implied that it would speed the

development of its own digital currency in response. Now China is poised to become the first major economy to issue a digital version of its money, which it intends as a replacement for physical cash.

China's leaders apparently see Libra, meant to be backed by a reserve that will be mostly US dollars, as a threat: it could reinforce America's disproportionate power over the global financial system, which stems from the dollar's role as the world's de facto reserve currency. Some suspect China intends to promote its digital renminbi internationally.

Now Facebook's Libra pitch has become geopolitical. In October, CEO Mark Zuckerberg promised Congress that Libra "will extend America's financial leadership as well as our democratic values and oversight around the world." The digital money wars have begun.

AI-discovered Molecules

Scientists have used AI to discover promising drug-like compounds.

- The universe of molecules that could be turned into potentially life-saving drugs is mind-boggling in size: researchers estimate the number at around 1060. That's more than all the atoms in the solar system, offering virtually unlimited chemical possibilities—if only chemists could find the worthwhile ones.

Now machine-learning tools can explore large databases of existing molecules and their properties, using the information to generate new possibilities. This could make it faster and cheaper to discover new drug candidates.

In September, a team of researchers at Hong Kong-based Insilico Medicine and the University of Toronto took a convincing step toward showing that the strategy works by synthesizing several drug candidates found by AI algorithms.

Using techniques like deep learning and generative models similar to the ones that allowed a computer to beat the world champion at the ancient game of Go, the researchers identified some 30,000 novel molecules with desirable properties. They selected six to synthesize and test. One was particularly active and proved promising in animal tests.

Chemists in drug discovery often dream up new molecules—an art honed by years of experience and, among the best drug hunters, by a keen intuition. Now these scientists have a new tool to expand their imaginations.

Satellite Mega-Constellations

We can now affordably build, launch, and operate tens of thousands of satellites in orbit at once.

Satellites that can beam a broadband connection to internet terminals. As long as these terminals have a clear view of the sky, they can deliver internet to any nearby devices. SpaceX alone wants to send more than 4.5 times more satellites into orbit this decade than humans have ever launched since Sputnik.

These mega-constellations are feasible because we have learned how to build smaller satellites and launch them more cheaply. During the space shuttle era, launching a satellite into space cost roughly \$24,800 per pound. A small communications satellite that weighed four tons cost nearly \$200 million to fly up.

Today a SpaceX Starlink satellite weighs about 500 pounds (227 kilograms). Reusable architecture and cheaper manufacturing mean we can strap dozens of them onto rockets to greatly lower the cost; a SpaceX Falcon 9 launch today costs about \$1,240 per pound.

The first 120 Starlink satellites went up last year, and the company planned to launch batches of 60 every two weeks starting in January 2020. OneWeb will launch over 30 satellites later this year. We could soon see thousands of satellites working in tandem to supply internet access for even the poorest and most remote populations on the planet.

But that's only if things work out. Some researchers are livid because they fear these objects will disrupt astronomy research. Worse is the prospect of a collision that could cascade into a catastrophe of millions of pieces of space debris, making satellite services and future space exploration next to impossible. Starlink's near-miss with an ESA weather satellite in September was a jolting reminder that the world is woefully unprepared to manage this much orbital traffic. What happens with these mega-constellations this decade will define the future of orbital space.

Quantum Supremacy

Google has provided the first clear proof of a quantum computer outperforming a classical one.

Quantum computers store and process data in a way completely differently from the ones we're all used to. In theory, they could tackle certain classes of problems that even the most powerful classical supercomputer imaginable would take millennia to solve, like breaking

today's cryptographic codes or simulating the precise behavior of molecules to help discover new drugs and materials.

There have been working quantum computers for several years, but it's only under certain conditions that they outperform classical ones, and in October Google claimed the first such demonstration of "quantum supremacy." A computer with 53 qubits—the basic unit of quantum computation—did a calculation in a little over three minutes that, by Google's reckoning, would have taken the world's biggest supercomputer 10,000 years, or 1.5 billion times as long. IBM challenged Google's claim, saying the speedup would be a thousandfold at best; even so, it was a milestone, and each additional qubit will make the computer twice as fast.

However, Google's demo was strictly a proof of concept—the equivalent of doing random sums on a calculator and showing that the answers are right. The goal now is to build machines with enough qubits to solve useful problems. This is a formidable challenge: the more qubits you have, the harder it is to maintain their delicate quantum state. Google's engineers believe the approach they're using can get them to somewhere between 100 and 1,000 qubits, which may be enough to do something useful—but nobody is quite sure what.

And beyond that? Machines that can crack today's cryptography will require millions of qubits; it will probably take decades to get there. But one that can model molecules should be easier to build.

Tiny AI

We can now run powerful AI algorithms on our phones.

AI has a problem: in the quest to build more powerful algorithms, researchers are using ever greater amounts of data and computing power, and relying on centralized cloud services. This not only generates alarming amounts of carbon emissions but also limits the speed and privacy of AI applications.

But a countertrend of tiny AI is changing that. Tech giants and academic researchers are working on new algorithms to shrink existing deep-learning models without losing their capabilities. Meanwhile, an emerging generation of specialized AI chips promises to pack more computational power into tighter physical spaces, and train and run AI on far less energy.

These advances are just starting to become available to consumers. Last May, Google announced that it can now run Google Assistant on users' phones without sending requests to a remote server. As of iOS 13, Apple runs Siri's speech recognition capabilities and its

QuickType keyboard locally on the iPhone. IBM and Amazon now also offer developer platforms for making and deploying tiny AI.

All this could bring about many benefits. Existing services like voice assistants, autocorrect, and digital cameras will get better and faster without having to ping the cloud every time they need access to a deep-learning model. Tiny AI will also make new applications possible, like mobile-based medical-image analysis or self-driving cars with faster reaction times. Finally, localized AI is better for privacy, since your data no longer needs to leave your device to improve a service or a feature.

But as the benefits of AI become distributed, so will all its challenges. It could become harder to combat surveillance systems or deepfake videos, for example, and discriminatory algorithms could also proliferate. Researchers, engineers, and policymakers need to work together now to develop technical and policy checks on these potential harms.

Differential Privacy

A technique to measure the privacy of a crucial data set.

In 2020, the US government has a big task: collect data on the country's 330 million residents while keeping their identities private. The data is released in statistical tables that policymakers and academics analyze when writing legislation or conducting research. By law, the Census Bureau must make sure that it can't lead back to any individuals.

But there are tricks to "de-anonymize" individuals, especially if the census data is combined with other public statistics.

So the Census Bureau injects inaccuracies, or "noise," into the data. It might make some people younger and others older, or label some white people as black and vice versa, while keeping the totals of each age or ethnic group the same. The more noise you inject, the harder de-anonymization becomes.

Differential privacy is a mathematical technique that makes this process rigorous by measuring how much privacy increases when noise is added. The method is already used by Apple and Facebook to collect aggregate data without identifying particular users.

But too much noise can render the data useless. One analysis showed that a differentially private version of the 2010 Census included households that supposedly had 90 people.

If all goes well, the method will likely be used by other federal agencies. Countries like Canada and the UK are watching too.