

Indian Technology Congress

Industry 4.0: Engineering
the Interface with Real World

R E P O R T
I T C 2 0 1 7

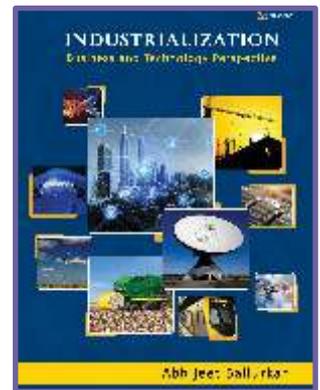
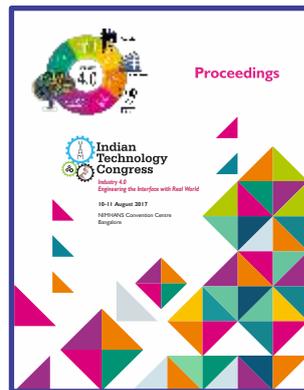
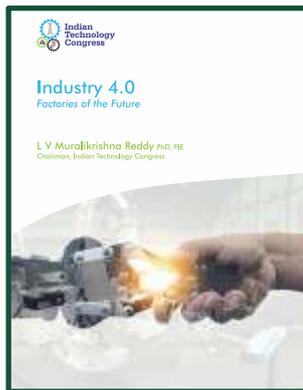




ITC-2017, the fifth in the series, was organized by Foundation for Educational Excellence (FEE), World Federation of Engineering Organizations (WFEO), The Institute of Electrical and Electronics Engineers (IEEE), American Society of Mechanical Engineers (ASME), World Academy of Engineers (WAE), BRICS Federation of Engineering Organisations (BRICS-FEO), Indian Institution of Production Engineers (IIPe) and other professional associations actively involved with technology promotion.



Release of ITC 2017 Proceedings



This summary captures a two-day programme of presentations, keynote addresses, panel discussions and interactive dialogue at the technology conference on the theme **'Industry 4.0: Engineering the Interface with Real World'** including contemporary technologies-Artificial Intelligence, Robotics, Simulation, System Engineering, Additive Manufacturing, Industrial Internet of Things, Cyber Security, Cloud Computing, and Augmented Reality. Deliberations on these technologies included deployment scenarios resulting in **"Future Factories"** with entirely new functionality and capabilities that would help position India as the **"World's Manufacturing Hub"**.

The workshop on Agri-Tech inclusion had participation by Government departments, organizations, national research institutes, and leading players in the private sector. Over 30 prominent agricultural technologies were showcased during the two-day event with over 58 keynote addresses by renowned practitioners making the event comprehensive from the standpoint of knowledge dissemination. Participation and interest in this new feature of ITC have prompted the Organizing Committee to make this Agri-Tech an annual feature from next year.

International participation has burgeoned this year with over seven international speakers from South Africa, Switzerland, United Kingdom, the USA participating and sharing their valuable experience. The World Federation of Engineering Organizations (WFEO), an organization supported under the aegis of UNESCO collaborated with ITC to organize a session **"From ICT to IoT"** capturing the key learnings as we deploy information technologies to move to a paradigm of a connected world.

The highlights of the conference included a record 1100+ participants; 110 speakers across 20 sessions, 58 keynote addresses, with over 83 researchers presented their work for peer-review and progression towards sustainable products, solution, and services. Industry participation was significant with over 48 technologies being showcased during the two-day exhibition organized concurrently with the Congress. 18 Start-ups utilized this unique networking and collaboration platform to reach out to potential investors, partners, and prospects. 32 Professional organizations associated with technology promotion in India and abroad participated in this technology exposition. 55 organizations participated as sponsors underscoring the utility and reach of ITC as a platform for 'Innovation through Collaboration'. Four publications were brought out commemorating the fifth edition of Indian Technology Congress, ITC-2017. The concurrent workshops on relevant themes of "Inclusive Agriculture" and "Patents and Intellectual Property Rights" are also well received by the participants.





INAUGURAL SESSION

The Inaugural session had the participation of Dr. M Annadurai, Director, ISRO Satellite Centre as the Chief Guest. Dignitaries on the dais included Dr. V Prakash, Distinguished Scientist, CSIR-India; Dr. S Ayyappan, Chair Professor, NABARD; Prof. R M Vasagam, Chairman, National Advisory Committee, ITC-2017; Dr. L.V. Muralikrishna Reddy, Chairman, Indian Technology Congress; Dr. Wooday P Krishna, National President, Indian Institution of Production Engineers; Dr. K Gopalakrishnan, Council Member, The Institution of Engineers (India); and Dr. K Ramachandra, Director, National Design and Research Forum, The Institution of Engineers (India).



L.V. Muralikrishna Reddy

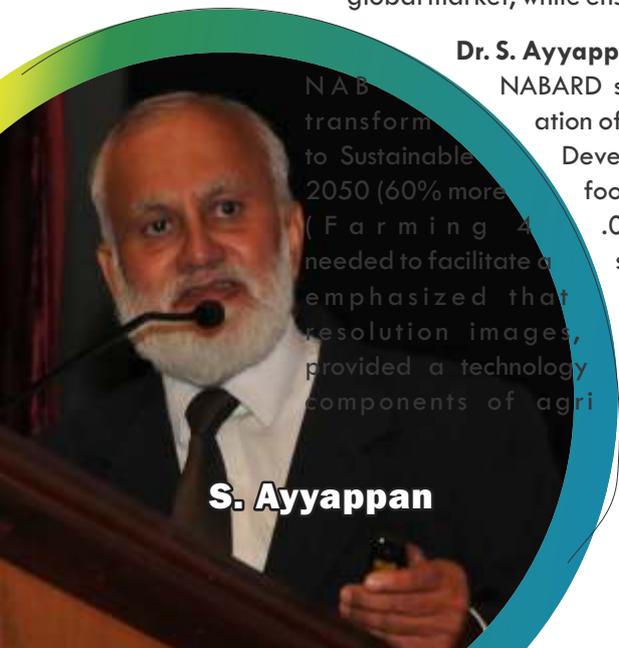
In his Welcome Address, **Dr. L.V. Muralikrishna Reddy** highlighted that while the adoption of information and communication technologies over the last two decades has facilitated digitisation and integration of vertical and horizontal value chains, the coming together of myriad digital technologies including mobile devices; 3D printing; cloud computing; smart sensors; augmented reality and wearables; Internet of Things (IoT) platform; human-machine interfaces; location detection technologies; Big data and analytics; and authentication and fraud detection technologies has enabled the digitisation of product and service offerings of organizations and development of digital business models with real-time customer access. He articulated the objective of ITC-2017 being the development of an actionable plan to create the factories of the future, and urged the participants to focus on promoting **“Innovation through collaboration”**.

Dr. Wooday P. Krishna talking about ITC-2017 emphasized the relevance of Industry 4.0 to address the needs of the domestic market, grab a sustainable share of the global market, while ensuring gainful employment for all.



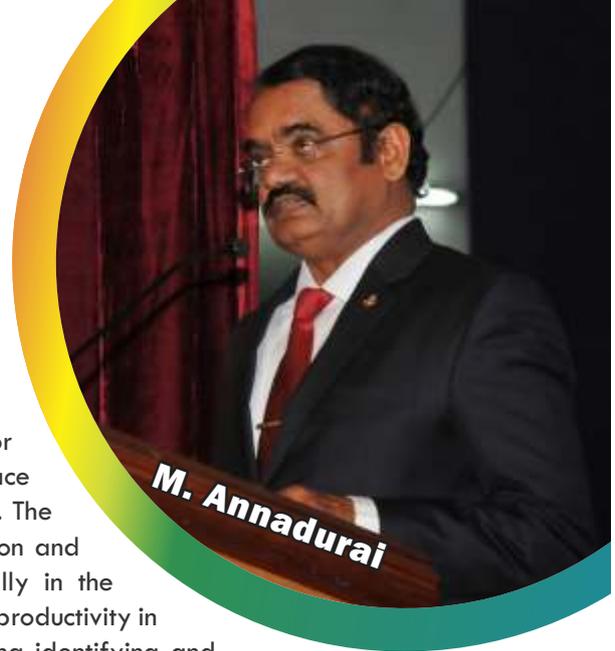
Wooday P. Krishna

Dr. S. Ayyappan, Chairman, Agri-Tech Inclusion ITC, and Chair Professor NABARD spoke on **“Technology Led-Agriculture”**. He traced the evolution of the United Nations’ Millennium Development Goals (MDGs) to Sustainable Development Goals (SDGs). The challenge of feeding 9 billion by 2050 (60% more food) can be met by not only Industry 4.0 but redefining IoT for F4.0 (Farming 4.0) Standards (Smart Farming for Smart Farmers). Agri-Engg interventions are second green revolution comprising agri-robotics and agri-precision. He emphasized that imaging applications for agriculture from Drones, satellite based high resolution images, provided a technology partnership framework and talked of vertical agriculture in urban areas, business and protected cultivation.



S. Ayyappan

In his inaugural remarks, **Dr. M. Annadurai**, Director ISRO Satellite Centre compared agriculture to rocket science given the common threads of process-oriented approach and requirement of demonstrating commercial viability. Proceeding to articulate his vision for Industry 4.0 and IoT for Agriculture, Dr. Annadurai emphasized that Space technology has emerged as an integrator technology for IoT systems. The large number of ISRO's satellites present in communication, navigation and remote sensing segments from space can effectively help especially in the management of agri-development of rain-fed areas and increase the productivity in irrigated areas. The meteorological payloads are useful in facilitating identifying and tracking the rain-fed areas cultivation scenarios throughout the growing periods. The remote sensing payloads monitor the growth and harvesting scenarios. The new technologies with low earth orbit Hyper spectral Remote Sensing, Microwave Remote Sensing and high resolution sensors from geostationary satellites cover the scale and space of monitoring parameters for agri-development.



M. Annadurai



R.M. Vasagam

Prof. R M Vasagam, Chairman, National Advisory Committee, ITC talked about Space and Agriculture. While noting that remote sensing had made tremendous advancements in crop monitoring and drought analysis, these advancements must be made available to the grass root level users/ farmers. He remembered Dr. Sarabhai for inculcating a scientific thirst in the teams at ISRO. He was keen that **“Declarations and announcements during ITC 2017 should lead to actions”**.

Dr. K. Gopalakrishnan, Council Member, The Institution of Engineers (India), Chairman, Academic Advisory Committee, ITC 2017 proposed the Vote of Thanks to all the Dignitaries, Sponsors, Speakers, Exhibitors, Delegates and Supporters.



K. Gopalakrishnan

ITC AWARDS





V. Prakash

Industry 4.0: Industrial Opportunities and Challenges

The Plenary Session saw renowned keynote speakers share their perspective on the impact of technologies on the industrial sector in the country.

Dr. V. Prakash, Distinguished Scientist, CSIR, Former Director CFTRI, Mysore and Padma Shri Awardee spoke on **“Indian Agri-Tech in Isolation”**. He lucidly explained how the hot climate is reducing yield; and proposed value chain for enhancing value of Agri-Tech sector. There is a need for a paradigm shift towards rural industrialization, quality, process and policy to supplement the existing thrust on urban development, quantity, production and technology. The earlier **“Milk / White” Revolution** brought in 50 milk products with value addition through food processing. He opined that there was a need and potential to usher in products through food processing using rice, ragi, wheat, etc. The need of the hour for Indian progress is **“Transactional Leadership”**, **“Transcendental Performance”**, and **“Transformational Leadership”**. The key to enhanced productivity today is not limited to new ideas, new paths, and new products, but **“Translational Innovation”**.



Raghupathi N. Cavale

Mr. Raghupathi N. Cavale, Head, Strategic Business Practice-INDIA, Infosys dwelt on the **“servicification”** of industries globally, and highlighted various initiatives including the establishment of Infosys Digital Farm, and the disruptive potential of Industry 4.0 technology stack primarily Artificial Intelligence and Machine Learning.

Mr. K.E. Raghunathan, National President, All India Manufacturers' Organization highlighted various initiatives to enhance the collective strength of the engineering community, and the creation of a platform to connect all the stake holders. Dwelling on **“Creating Smart Engineers”**, he opined that the **collective strength of engineers** is yet to be effectively harnessed. Unemployability and skilling are critical needs to be addressed; and engineering research and development needs to be aligned with industrial needs by industries being encouraged to fund engineering R&D projects being pursued by academia. There is substantial scope to leverage the strength and diversity available amongst the MSME units. Highlighting the presence and importance of the MSME sector, he brought out important statistics including that there are 650 lakhs MSME units out of total 875 lakhs of industries. He highlighted the role of AIMO in uniting the stakeholders. In January 2018, a web portal of AIMO would be launched in association with NASSCOM / AICTE/ IET/IEEE/State Higher Education Departments.



K.E. Raghunathan



Greg Gorman

From ICT to IoT: Realizing the Potential of a Connected World



The World Federation of Engineering Organizations (WFEO) is an international, non-governmental organization representing the engineering profession globally. Founded in 1968 by a group of regional engineering organizations, under the auspices of the United Nations Educational, Scientific and Cultural Organization (UNESCO) in Paris, WFEO brings together national engineering organizations from over 90 nations and represents some 20 million engineers from around the world.

The WFEO Standing Technical Committee on Information and Communication hosted by the Institution of Engineers, India is collaborating with professional societies and organizations focused on technology promotion to increase the awareness and dissemination of knowledge on contemporary technology themes in Information and Communication Technologies, and how these themes are essential for global sustainable development. The Standing Committee is chaired by Er. S S Rathore, Vice President WFEO and Past President, The Institution of Engineers (India).

The Committee seeks to establish linkages with various international, regional, and national institutions involved in promotion of engineering practices, and promote innovation through integration of academic institutions, research organizations, and industry together to think, develop, and implement engineering solutions for complex problems by capitalizing on their innovative capabilities.

This session was chaired by **Eng. Yashin Brijmohan**, Vice President, WFEO, Executive Dean, Monash University, South Africa. He detailed the IoT ecosystem being promoted by WFEO in partnership with UNESCO, South Africa, and India. He articulated the intent to build collaboration with ISRO on many aspects of Education on “Space-based IOT networked Landscapes”. Eng. Brij Mohan highlighted that there is one engineer per 7000 in South Africa compared to 1 in 311 in United Kingdom and 1 in 227 in Brazil. He urged the engineering fraternity to “reimagine” harnessing human potential by a. Education and Training, b. Knowledge Society and Knowledge work, c. Lifelong Learning (continuing education) , d. up skilling challenges, e. Future ethics human potential perspective. Contemporary engineering developments have seen that classrooms moving out of not dependent on location and is moving towards virtual and online systems. The mobile laboratories and simulators are replacing expensive educational



Eng. Yashin Brijmohan

infrastructure. Eng. Brijmohan urged the academia to rigorously review the efficacy of the current systems of grades, outcomes and assessment methodologies in fostering a culture of innovation and entrepreneurship. He emphasised the need to move from collaboration to partnership in all spheres. Mr. Brijmohan emphasized the various capacity-building initiatives promoted by WFEO, and encouraged participants to leverage these to network with citizens globally.

Mr. Greg Gorman, Director IOT Developer Ecosystem, IBM, USA articulated the shift in focus to empowering 'Citizen-Developers', recognizing the need for an ecosystem to drive technology absorption. He demonstrated how an IoT device could accurately portray the general mood of the social media regarding a topic.



Syam Madanapalli

Mr. Syam Madanapalli, Director IoT, NTT Data Services dwelt on how Consumers, Business and Government could play a major role in promoting adoption of IoT. He went on to talk about Factor 4 which describes the tendency of technology to improve processes by a factor of four and that the issues that impact adoption are Interoperability, Security and Infrastructure. Mr. Syam Madanapalli lucidly highlighted the role of engineers in advancing our civilization, and exhorted engineers to focus on innovations, as this would propel a positive virtuous cycle of job creation leading to economic growth.

Dr. Balamuralidhar .P, Head, TCS Innovation Labs led the 'deep-dive' into the technical aspects of IoT. Technical parameters that describe a device include Presence, Identity, Location, State and Relations. In business terms, this would translate to Change, Anomaly and Measurements. Highlighting that technology adoption needs the development of the 'people context', he cited the example of pet robots understanding the owner's mood through wearable IoT devices.



Balamuralidhar .P



Industry 4.0: Future Factories

Cutting-edge technologies are being developed that will change the way things are produced, resulting in Industry 4.0, or the fourth industrial revolution. Industry 4.0 is a paradigm that will see machines collaborating seamlessly and performing increasingly complex tasks; accurately predicting downtimes and failures, and triggering maintenance processes; and perhaps even 'self-organizing' themselves to respond to unscheduled disruptions in the production line.

Present-day manufacturing automation systems are oriented towards high-volume/low-mix production with centralized control. Future factories will have a plethora of sensors that would be acquiring measurements continuously, and robotic systems that have significantly higher levels of intelligence and decision-making capabilities. The production setup will metamorphose from a high-volume/low-mix (large numbers of standardized products) to a high-mix/low-volume (many customized products) paradigm as products will be more closely tailored to a customer's requirements.



**Shivkumar
Kalyanaraman**

This session “**Industry 4.0: Future Factories**” featured keynote addresses by Subject Matter Experts from the industry and academia who presented case-studies on successful implementations of Industry 4.0 technology stack.

In his address as Session Chair, **Dr. Shivkumar Kalyanaraman**, Program Director, Special Initiatives IBM Research India, noted the transition from Rigid Manipulator Robots to Compliant Collaborative robots (Cobots). He believed that IoT can deliver significant value once the product leaves the factory in the context of leveraging 'stickiness' with the customer and generating post-product sale revenues through Maintenance and Service Revenues. As an example, he cited a project where block chain enabled early recall or preventive maintenance of parts which were created in the same batch.



**Amresh
Chakrabarti**

Prof. Amaresh Chakrabarti, Chairman, Centre for Product Design and Manufacturing, IISc., described many successful products that came through successful engagements between industry and students. He highlighted **Purak**, an affordable advanced prosthetic arm that achieved a 10x reduction in cost. He articulated that a Smart System would have Self Awareness, Connectedness, Storage Capacity and Autonomy, as the distinguishing features.

Mr. Lokesh Payik, Chief of Business-Connected Industry (Industry 4.0), Robert Bosch Engineering and Business Solutions spoke on how IoT technology is being leveraged to and reduce capex through preventive and predictive maintenance; and the need to make manufacturing data available in real-time.



Lokesh Payik

Mr. Amitava Roy, Founder, Innovio Intellectual Property and Solutions summed up the session deliberations as Co-Chair by highlighting the need to assess and develop methods to deploy contemporary technologies to meet the requirements of citizens at the bottom of the pyramid, or the 'mass-markets'. He cited case studies on challenge to increase the milk yield in the Indian dairy industry, and how IoT could be made useful to the Indian marginal farmers.



Amita Roy



Next Generation Technologies: Challenges and Strategies for Adoption in India



In his opening remarks as Session Chair, **Dr. K. Ramachandra**, Director NDRF, IEL; and former Director GTRE-DRDO spoke of how 3D printing can be used for manufacturing numerous products ranging from “Om” to agri-tech tools in the farm sector. He articulated how drone-based remote sensors (with about 500 start-ups working in this emerging area) can promote e-governance at local levels for doing better e-governance (Ease of Doing Business) and the need to overcome the lag between technology development and technology adoption.

Mr. Ravisankaran .A, General Manager, Product Development and Innovation Centre, Bharat Electronics Limited gave an inspiring presentation on “Leveraging IOT Technologies for Enhancing Operational Performance in Central Public Sector Enterprises”. The landscape of Industry 4.0 includes autonomous robots, Big Data, Augmented Reality, Cloud Computing, IoT etc. IoT is being used to boost productivity, reduce times to market, and improve customer responsiveness. IoT can enhance horizontal integration among Cyber Physical Systems (CPS entities). The technology adoption in BEL across 9 centres in India uses real-time optimization, predictive maintenance, operational effectiveness of networks and BEL is encouraging / has taken up work on Smart Cities related technologies in IoT.



Mr. Sundar N. Ramalingam, Head Deep Learning Practices, NVIDIA spoke on AI and Deep Learning. Talking about the data-centric world of today, he recounted how the world is generating one Terabyte of data by running turbines, 2.5 Petabytes of customer data, with about 350 million images being uploaded per day on Facebook. He elaborated on how Deep Learning approach is about creating learning algorithms the computer can leverage to understand and modify its behaviour. AlphaGo, a Chinese game uses Artificial Intelligence, Machine Learning and Deep Learning techniques that simulate human brain functioning to an extent, and make decisions for innovation. There is a need to transition from data analytics to pattern analytics. Major drivers in IoT are Big Data Availability, New ML Techniques and GPU acceleration. He further said “...Powering deep learning ecosystem reduced computational time to milliseconds”.



Mr. Sameer Patnaik, Co-Founder, Machstats, elaborated on a case study where AI was successfully implemented to reduce accidents and to count products. He was confident that the use of AI will become pervasive in automotive sector, leading to its adoption in the industrial sector.

Dr. Enti Ranga Reddy, Co-Chair, Chairman and MD, Legend Technologies highlighted the advantage of the ecosystem provided by the government to encourage Industry 4.0 in India. He made appeal for students to return to manufacturing engineering so that we can meet Make in India aspirations.





Harnessing Engineering Innovations for Indian Energy Sector

This Session was Chaired by **Dr. Gopalan Jagadeesh**, Professor, Department of Aerospace Engineering, IISc., and Director, Super-Wave Technology Private Limited, an Indian Institute of Science initiative. He highlighted how interdisciplinary solutions are being used to address challenges in different sectors, and utilized the example of Shock-Wave assisted Fracking Technology being used in the Oil and Gas sector.



Gopalan Jagadeesh

In his keynote address, **Mr. H M Gupta**, Executive Director, Oil and Natural Gas Corporation Limited highlighted the importance and complexity of the Oil and Gas Sector in the context of demand for oil and geopolitical interferences. Mr. Gupta opined that India can surpass China soon in Oil and Gas production targets. Recounting the growth of ONGC to address the need for India's oil security, he recounted that while in 1995, ONGC was meeting only 25% of the domestic needs, with the rest being imported; ONGC has invested Rupees 10 Billion in Krishna Godavari Basin oil fields, and the new technologies have been successful in a. overcoming practical / living challenges in KG Basin, b. All equipment being mapped under CMMS (computerized main management system) scheme, c. Facility for online data analysis, as Oil is going to be crucial for India's growth for at least another 40 years.

He emphasised that ONGC is focused on promoting a. condition based maintenance, b. breakdown maintenance, c. predictive maintenance.



H.M. Gupta



Role of Technical Education in Making India Ready for Industry 4.0



S. S. Iyengar

Prof. S.S. Iyengar, Director Florida International University School of Computing Sciences, USA chaired the session. In his speech, he told IoT is to be used in mining, Oil and Gas, Health, Climate Change, and Defense. IOT should clearly have the following sub systems defined while bringing innovation. The plant routing, field networks, embedded networking, physical security. We must shape Skill tests and Curriculum to match the readiness in adapting and implementation that too while persuading Make in India IoT sensors in future. IoT is to be used profusely in India for Agriculture, Railways, Healthcare, Manufacturing and Underground vehicles. He emphasised the need for training young engineering students at universities and colleges by bringing in corresponding changes in curricular design and delivery mechanisms.



**Balasubramanian
Krishnan**

Dr. Balasubramanian Krishnan spoke on “Accelerated Learning and Development Strategies Learning 4.0”. The “Ashram Learning” had its parameters for assessment as 1. Content, 2. Instructor, 3. Delivery Mechanism. Current scenario is also same and parameters can be put as – 1. Exponential content growth, Devices, Feedback from applications and experience. He emphasized on MOOCS. The modern issues to consider are the organization and management of 1. Information, 2. Audience, 3. Attention span. The methods to consider are a. anywhere, b. 24/7 learning, c. micro learning, d. learning analytics, e. continuous feedback, f. artificial intelligence. He included the above to specify a learning framework. Quoted examples including OLA Taxi and Amazon.in.



Ravi

Dr. Ravi, President FKCCI, spoke of skilling activities for industry readiness of graduates at Higher Education Institutions. He opined the need for 500 million skilled work forces in MSMEs by year 2050. ITI and vocational institutes should upgrade themselves and act as finishing schools not only for ITI level but also for practical incubation centers, start-ups, R&D and also GST trained for each sector.

Dr. Ramakrishna Menon, GM Projects and Design, ROBERT BOSCH spoke of Industry 4.0 version which is adopted in BOSCH. The mechanization, electrification, computerization and cyber physical systems affect the engineering education and young minds have to be trained locally. We can do this right and by offloading mathematics to machines wherever possible. This leads us to focus on Emotion Intelligence.



**Ramakrishna
Menon**



Anandi Charan Sahu



**Vijaya
Bhaskar Raju**

Mr. Anandi Charan Sahu, General Manager, SIDBI spoke of “invent, innovate and prosper OTHERWISE perish”. They have schemes like SMILE, Stand-up India to promote MSMEs ecosystem. This has funding from 10 lakhs to one crore of rupees.

Dr. Vijay Bhaskar Raju, Director, GITAM University- Bengaluru Campus spoke of dwindling importance for core branches like civil, mechanical and electrical by the onslaught of IT. He felt that it is time to focus on inter disciplinary skill development initiatives are important to adapt Industry 4.0 trends in engineering education system and to bridge gap between industry and academia.

Prof. BVA Rao, Former Director VIT Vellore, HOD IIT Chennai, Former Chairman, NDRF IEI spoke of challenges in Indian Higher Education system. Engineers of tomorrow should develop technologies for agriculture, water, industry; All multinationals companies aim at sustainable development in their agenda, this should be included in HE in colleges.



BVA Rao

Dr. SK Prasad, Founder and Chairman, Global School of Professional of Continuing Education (GSPACE), who Co-Chaired the Session said that Indian Higher Education System in general and technical education shall be geared up in order to provide required human capital to the industry and he had stressed the need for a collaborative effort between universities and industry in making India Industry 4.0 ready.



S.K. Prasad



Valedictory Session

The technical sessions over two days were precisely summarized by **Dr. C.J. Jagadeesha**, Former ISRO Scientist and ITC Core Team Member to arrive at the key take aways from each session, and the development of the **ITC-2017 Bangalore Declaration** that was jointly presented with **Dr. Wooday P. Krishna**.

Er. Yashin Brijmohan referred to the World Economic Forum recognizing IT based Agriculture and Industry for inclusion in economic discussions and policy making. He articulated the need for BRICS countries to be involved in developing a cogent policy in the context of these countries being the powerhouse for future global growth and progress, and was keen that professional organizations representing BRICS to be incorporated as partners for developing the Industry4.0 adoption roadmap.

The **World Federation of Engineering Organizations (WFEO)** is keen on leveraging ecosystems developed by various Committees including the **Committee for Information and Communication (CIC)** for capacity-building. He highlighted initiatives to expand participation by organizations focused on IoT in South Africa and India.

Paper Presentations

There were **“TECHNICAL PAPER PRESENTATIONS”** by students and faculty of engineering colleges and institutions. Though there was an overwhelming response of 187 papers received for ITC 2017, only 83 could be presented in ITC on both the days due to paucity of time.

Three best paper awards were chosen:

First Prize: “IoT and Neural Networks based Multi-region and Simultaneous Leakage” by Mr. Pradyot Aramane and Nishant Aital, Final Year students of RVCE Bangalore

Second Prize:

1. “Long Range Low Power Smart Community Communication Backbone (SCOBA)”, by Pravesh Kumar Tejan and Pankaj Mohan Gupta

2. “Memristors and their Potential Applications” by Mr. Jayaprasad KV, Kochi College of Engineering Kochi.

Third Prize: “IoT-Based Smart Commuting in Buses on Indian Roads” by Mr. Binoyak Krishnaswamy, IIT Patna.

Vote of Thanks was proposed by **Dr. Enti Ranga Reddy**, CMD, Legend Technologies. Efforts of the team supporting ITC-2017 were recognized by inviting them to receive mementoes from the Dignitaries.

Dr. L.V. Muralikrishna Reddy, Chairman, Organizing Committee, ITC recognized all Sponsors, Supporters and Stakeholders for their unequivocal support and patronage for ITC-2017, and announced that **ITC-2018** would be organized in Bangalore during **3-4 September 2018**.

Exhibitors

Over **48** exhibitors participated in this two-day event showcasing technologies, products, solutions, and services related to the theme of ITC-2017.







Indian Technology Congress

10-11 August 2017
NIMHANS Convention Centre
Bengaluru

ITC-2017 Bengaluru Declaration

“Industry 4.0: Engineering the Interface with Real World”

- Industrial Internet of Things (IIoT) facilitates transformation of the manufacturing process into a 'smart environment'. Cyber-Physical Systems comprise of intelligent manufacturing systems, warehousing systems and production facilities that are digitally enabled and feature end-to-end ICT-based integration, from inbound logistics to production, marketing, outbound logistics and customer service. This enables production to be configured flexibly.
- Industry 4.0 is focused on creating smart products, procedures and processes. 'Smart factories' are a key differentiator in the Industry 4.0 paradigm. Smart factories can handle varying complexities, less prone to disruption, and can manufacture products more efficiently. In a smart factory, citizens, machines, and resources can communicate efficiently and seamlessly.
- India can succeed in its endeavour to become a 'Global Manufacturing Destination' by adopting Industry 4.0 technologies. Enhanced productivity, quality, innovation, and ability to adopt disruptive technologies will be the hallmark of Industry 4.0. Indian academic and research institutions, public and private sector industries, financial institutions supporting innovation and entrepreneurship and start-ups will play a key role in promoting adoption of Industry 4.0 technologies.
- High Bandwidth Communication Networks for Industry: Reliable, secure high bandwidth communication networks are critical for successful adoption of Industry 4.0. The engineering fraternity, industry, and academia will need to work closely with the government and stakeholders to upgrade the broadband infrastructure and make it affordable for industry, irrespective of the size and scale; entrepreneurs; academia; and researchers.
- Managing Complex Systems: Manufacturing systems of the future will be complex with layers of intelligence. It is imperative that the future workforce should be equipped with methodologies and tools to manage systems with increasing complexities.
- India should play a prominent role in leveraging the power of Digital Technologies, and integrating the value-addition to both industry and society leading to the development of a sustainable and progressive world ethos. India should create a highly skilled workforce for the Intelligent Machine Age as envisioned in the World Economic Forum. The need of the hour is to create a level playing field for Large, Medium, Small and Micro Industries, well-established and upcoming technical institutions and investors all over the country.
- Redefining Work Organization: Following the adoption of Industry 4.0 technology stack, the role of employees is likely to change significantly with changes in the work processes, production environment, and the individual work content. To facilitate the workforce enhancing their personal development and assuming higher responsibilities, it will become imperative to adopt a 'lifelong learning paradigm' and participative work design methodologies.
- Building a Competitive, Resilient, and Global Manufacturing Ecosystem in India: This is the goal that the participating professional organizations of ITC have set for themselves to usher in Industry 4.0 in India. **Tech Congress** invites all interested stakeholders to explore deployment scenarios of the Industry 4.0 technology stack and implementation opportunities to usher in an era of 'Smart Manufacturing' to manufacture one-off items with low production volumes while remaining profitable and customer-focused. This will help strengthen the 'Make in India' mission of the Government of India a reality.
- India should emerge as a repository of new knowledge, provider of path-breaking solutions, developing contemporary intellectual property and patents, with continuous innovation through research and development of new materials, machines and manufacturing process to contribute to the growth of engineering and technology in the Industry 4.0 domain.
- Nurture and promote Industry 4.0 to grow the Indian economy to USD 10 Trillion in coming decade with contribution from both the manufacturing and service sectors.
- The need for a dedicated **Association for Technologists** comprising of scientists, engineers, entrepreneurs, and policy-makers has been echoed at many fora, including the previous editions of ITC; and has been gaining strength and momentum with the call to establish an Association under the **Societies Registration Act, 1860 / The Karnataka Societies Registration Act, 1960**. At the Valedictory Session of ITC-2017, a resolution was unanimously adopted that **Technology Professionals** from the industry, R&D Laboratories, and Academic Institutions should collaborate and “**Institutionalize**” the synergy and partnership by establishing the **Indian Technology Congress Association (ITCA)**.



Agri-Tech Inclusion - Bengaluru Declaration

Agriculture Sector, globally, is at the threshold of a needful paradigm shift, towards adoption of the smart solutions, particularly while facing climate change, volatility, shifting nutrition needs, and the increasing scarcity of most of the physical factors of production. The population trajectory indicates demand for food in multiple incrementals in the ensuing decades. **India an agrarian economy**, essentially has recognised that, going forward, farmers must produce more food per unit of land, water and other inputs, like agro-chemicals & machinery adopted.

Indian Technology Congress – 2017 (ITC-2017) focusing on AgriTech Inclusion, held on 10th & 11th Aug 2017 at Bengaluru, invited reasoned interactions, cutting across the thought silos intrinsic to different views and values to identify consensus, particularly the engineering & ICT technocrats with the food & agriculture domain experts and practitioners. ITC-2017 brought Agri-Engineering & Technologies to the forefront for collaboration with the mainstream Engineering professionals for the benefit of agriculture. Participation covered different dimensions of agriculture, representing the perspectives of the natural and social sciences, policy makers and academia, public and private. The event dealt with the most significant trends and the important priorities for the **“Indian Agriculture Next”** to identify appropriate science & engineering as well as ICT solutions towards sustainable food and agriculture systems in India. The Congress made the following resolution as the **Bengaluru Declaration for the “INDIAN AGRICULTURE NEXT....”**

The Congress, at the outset, looked at transformational agriculture. Focus was to augment the technology transformation in the primary sector – agriculture, taking cue from successful radical and world-changing innovations on par with that of every other field and align with the Government's policy initiatives viz., **'Make in India,' 'Digital India,' 'Infrastructure Modernization'** toward Indian Agriculture Next..., simultaneously as the fourth industrial revolution adopts to The **'Industry 4.0'** experience in its real sense.

Indian Technology Congress, in its sixth year of distinctive International Knowledge Exchange platform for India's Business Research and Academic Leaders to collaborate with Policy-makers and the Government towards promoting engineering innovation, resolved to constitute the **“AGRITECH ADVISORY BOARD”** as the platform, with a dedicate portal, dealing with the latest technology trends and it's adoption for agricultural excellence.

- Considering the enormous impacts by agricultural activities on most critical resources, **Farmer-Entrepreneurs (Agri-Preneurs)** engaged with the production should be guided on limitation of the vital ecosystem services & address towards sustainable agriculture. Also, the Farmer-Producer as well as the End users shall be engaged in the innovation processes.
- The overall outcome depends mostly on **small and medium farmers**, occupying major proportion of Indian farming community, constituting over 80% of the total land holdings size less than 5 acres. Appropriate technology innovations, solutions and applications with an inclusive approach, to consciously address towards transforming from the current 'more production' orientation towards preserving environment and natural resources. **The disruption shall be from the concept of “more” production towards adopting the concepts of “better” production and 'better' food systems.** The clarion call targeting for **Doubling the Agri-Preneur's Income before 2020 shall also adopt of time value for monies.**
- Align the agricultural technology innovations with the advent of **Industry 4.0**, wherein machines can predict failures and trigger maintenance processes autonomously or self-organized logistics, react to unexpected changes in production. Recognising the driving force as **Internet of Things & Agriculture**, with enormous complexities of production, establish the needful linkages with inputs and supplier networks. Focus will be towards creation of market demands & reach out with such innovative approaches resulting out of Industry 4.0 initiatives. Mentor every initiative for interconnecting multiple supportive technologies, customised to geographical regions, wherein the focus shall be on adaptation to the trends towards automation and data exchange in farming technologies.
- The future of farming lies in the **cyber-physical systems** monitoring physical processes, and making centralised decisions, in situ. IOT with the cyber-physical systems shall mutually communicate and also with humans in real time, across value chain. Such **Interoperability & Technical Assistance**, supports farming systems on aggregating and visualizing information comprehensibly for making informed decisions and solving problems continuously.
- Adapt the **Big Data Analytics** and Cloud Computing enabling early detection of climatic uncertainties, defects and production failures, the precautions exercised enhances productivity, quality, and agility benefits that have significant competitive value for the produced products. **Precision Farming**, thereon ensures localized customization, adding value to the products and services rendered, thanks to the IoT devices populate a wide variety of applications. Leverage these technological innovations for wide ranging applications in - Horticulture, Rain-fed, Green house/ Poly-house with controlled environment, Field Crops & Special Crops etc across the Agri-domains. Connected Agri-Life Science, through **Deep Learning and AI / AR / VR** based prediction controls against natural calamities, plant diseases as also insect attack.
- A dedicated expert team orients towards Farm mechanisation with **Smart Gadgets & Applications** ensuring enhanced farm productivity, adopt excellence in Agri-Tech deployments, engineering innovations & research for mechanization. Focus will be for designing simpler and effective machinery like robots, drones and other process automation of farming practices.
- Contemplating **Connected Farming Systems (CFS)**, with the end-to-end process automation using the ICT, associate the institutions focused on Deep Learning Platforms and IoT based Connected Systems of Systems, to provide near-accurate information for decision making right from sowing to monetization. With Online Connected Market Place, transform the agricultural value chains to adopt to Demand Based Inputs as also Outputs. Equally important is to ensure evaluation of every CFS advocated for its financial feasibility before large scale adoption.
- Last, but not the least, convergence of schemes under the Ministry of Agriculture and re-orient them to promote adoption of smart agricultural practices. Intensify every effort of capacity building and awareness generation among farmers, NGOs, and other stake holders is necessary to make Indian Agriculture SMART.



Indian Technology Congress

ITC Secretariat
 #3, First Main, BDA Layout,
 Kodihalli, HAL 2nd Stage,
 Bengaluru - 560 008
 Ph: +91 80 6559 2501
 TeleFax: +91 80 4850 8380
 participate@techcongress.net
 www.techcongress.net

