

# IoTNext 2015

## Global Summit on Innovating Digital Economy with IoT Solutions & Services

NEWSLETTER SPECIAL EDITION

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Digital Innovation is the main driver of economic growth around the world. Digital economy has converged its multi-disciplinary facets of IT, hardware, Big Data and Connectivity with Internet of Things (IoT), enabling a much more agile, efficient and cost effective service offering than in the past with partnerships and ecosystems. IT, technology companies, startups and academia in India have played a significant role in driving digital innovation around the world. Indian government recent focus on “Digital India”, “Smart Cities” and “Make in India” provide a huge opportunity for driving digital economy innovation, not just in India but all around the world.

# IoTNext 2016

## Message from the President

In December, Hotel Shangri-La, Bangalore, played host to the first of its kind 'Internet of Things' Summit, the IoTNext 2015. The IoT forum was started in July 2014 after which IESA and TiE partnered in September 2014. This event was a culmination of immense effort and lots of brainstorming by both the partners. All the hard work paid off handsomely, and the conference saw attendance of over 1000 delegates in addition to 50+ expert speakers, a large number of path-breaking start-ups, academicians, government officials and the like.

The exhibitor's pavilion was a virtual who's who of leaders in the IoT market-space with some of the most innovative start-ups demonstrating cutting-edge products. There were smart home and smart office solutions, predictive maintenance solutions for automobiles, wearable devices that would detect and alert impending medical emergencies and much, much more.

The panel discussions saw extremely lively interactions with topics ranging from Industry 4.0 to cyber-security for smart cities. The speakers also took a hard look at the feasibility of smart cities in India, how to accelerate adoption and the challenges that it would present. Almost every player in the IoT ecosystem from MNCs to start-ups and government organizations presented unique smart solutions for myriad problems, all leveraging IoT.

At the end of the summit, the overall mood was very upbeat with each participant going home with new ideas and new business opportunities having networked with their peers. The summit brought together sellers and buyers, venture capitalists and start-ups in need of funding, mentors and brilliant minds with innovative ideas searching for guidance.

Buoyed by the tremendous success of our first endeavour, both TiE and IESA hope to make this an annual affair, and what follows is a brief summary of how this summit unfolded and exceeded all our expectations. We are confident that IoTNext 2016 will galvanize India's digital economy with the many of the ideas we heard here coming to fruition.

**M N Vidyashankar**  
President, IESA

**Vinay Shenoy**  
Chairman, IESA

## SPEAKERS



**Vikram Shreekant Kirloskar**  
Vice Chairman of Toyota  
Kirloskar Motor Pvt. Ltd

### Theme Address

If you look at a modern car today, almost 10 to 15% is hardware and software, and these cannot fail in the most difficult driving conditions, in the most extreme weather conditions, etc. Most of these components are imported. So we have to two areas which has electronics and software, one is infotainment and the second portion which is a very big challenge is the electronics which go into engine management systems, into breaks, into traction control. All the automotive electronics and software is being imported at present. This is a huge opportunity and a huge challenge for all of you. If you want to make 'Make in India' successful, this is a key issue for India. For a country to grow, we have to manufacture more chip level hardware, silicon level hardware, etc.



**Gerd Hoefner**  
Managing Director & CEO,  
Siemens Technology India.

### Inaugural Keynote

Inaugural Keynote by Gerd Hoefner, Managing Director & CEO, Siemens Technology India Industrie 4.0 is a strategic initiative by the German manufacturing industry sponsored by the German government to secure future competitiveness of the German manufacturing industry by defining the way forward for manufacturing companies in the internet age. It was in 1999 that the word 'internet of things' was mentioned. An example is a Tesla car in need of repairs will automatically download the software or if necessary send a notification to the customer with an invitation to a valet to pick up the car and deliver to a Tesla facility. This is an IoT closed system for repair of the car. The future of manufacturing involves certain key elements; production network consisting of flexible value chains with information available in real-time across company boundaries, integration of product design and product engineering for shorter time to market, modular production units with complete and consistent virtual image.



**Dr Juergen Moessinger**  
Vice President – Engg Services,  
Robert Bosch

Industry 4.0 started in Germany as a way of rejuvenating the industries as all industry is moving to Asia. Now, it's a global topic, Industry 4.0 and IoT has become one of the major topics in Europe now. At Bosch, we believe industry 4.0 will change the way industry works and will have a huge impact on the future. Expectations from Industry 4.0 include volatile markets, change in speed and quality, shortened delivery times and product life cycles, disruptive business models, etc., and the forecasts include a digitalized value stream. Since India has a strong history of IT, using data to create valuable information, you can have real time control including in-process feedback, increased flexibility, optimum usage of resources and offline optimization including process optimization, cycle optimization, quality optimization, etc.

## Keynote on IoT – Smart Partitioning and Value Creation in a Connected World



**Colm Prendergast**  
Technology Director of IoT Analog Devices

The value creation of IoT and cloud is called the IoT multiplier effect. Over the next few years, the economic impact of IoT is expected to be in the region of about \$2.7 trillion. This will require solutions that can close value loops to efficiently modify behaviour, automation of data and information. DIKW processes are key to understanding how to efficiently modify behaviour. The sophistication and scope of IoT systems allow many options for implementing DIKW processing trade-offs depending on the application/use case. Conventional wisdom today suggests that processing in IoT systems should be done in the cloud. The key drivers behind this will be improving efficiency, healthcare and manufacturing. Substantial growth will be evident in the semiconductor area. Processing can be partitioned across multiple places throughout the hierarchy.

## Panel discussion on Leap forward to Industry 4.0 for #Make In India



**A Gururaj**  
MD, Vittal Innovation City  
(Former Director &  
General Manager, Flex)

### Chair:

Each of us has diverse views about what Industry 4.0 means to each one of us. I believe there is a big gap in India 4.0, especially when it comes to skills necessary for Industry 4.0. There are two aspects to look at, one is that it is 11.5% cheaper to manufacture in India compared to importing from China. Even if all these companies put up units in India, we don't have the skilled labour who can handle putting together the final product.



**Srikanth Srinivasan**  
Leader- Manufacturing, GE India.

### Panelists:

As manufacturing entities, we look at bringing value to our customers. At present, we are past the inflection point where physical devices and business processes are coming close together very seamlessly. The costs of hardware and software have started to be so low that we are able to harness that to create value proposition. This should make it affordable for SMEs increasing production to unheard of volumes. I think India can definitely leapfrog in the area of IoT, but we need a very rigorous and focussed approach for this to succeed.



**Narendra Bhandari**  
Director at Intel, Software &  
Services Group

The cost of computing at all levels has been brought down by the focus on quality. Intelligence can be embedded in all parts of the network. Once you have computing at multiple layers, machine learning or adaptiveness of the infrastructure will become critical in the future. Industry 4.0 has adaptiveness and modularity built in in its tenets. Once the volume increases to huge levels, human labour, however clever, cannot manage, and you will need help from machines. Developers are going to change the culture, hardware and software developers will need to come together to build software platforms. When we talk about 'Make in India', we have a significant gap in design mentality, including industrial design, software design, UI design, etc.



**Mike Byrne**  
Director of Systems & Applications  
Industrial IoT, Analog Devices

Industrial automation through Industry 4.0 has the potential to increase quality. The weakness is the human element in this, the automation has to assist the human or change the role of the human for it to work. The higher cost economies are looking toward Industry 4.0 to increase efficiency and greater productivity as a result of which production costs are effectively getting lower. If India says to herself, I don't need Industry 4.0 and I will do things a different way, that would be a mistake. As it was rightly pointed out, there is a gap between skill sets and Industry 4.0 in certain areas compared to other parts of the world, but am sure Industry 4.0 could level the playing field.



**V. S. Mani**  
General Manager, Siemens

The reason India needs to get into 'Make in India' is to be a greater participant in the global value chains. This means we need to have a level of quality far higher than what we are traditionally accustomed to delivering. IoT is one of the ways how to achieve this kind of manufacturing. India needs more affordable devices, and we need to have an Indian nuance to IoT as being implemented globally. The systems we develop here need to assimilate the realities that are found in this ecosystem.

## Expert Talk:

### Smart Data to Business



**Bernhard Lang**  
Project Manager, Corporate Technology,  
Siemens

At Siemens, our approach is to combine technology with business, analyse process and physics of customers in terms of production. We collect data from sensors, do data analytics, transform data into information, and with business intelligence we transform that information into knowledge. Finally, we develop a business model jointly with customers. If we are smart, we don't have to collect all data, just the data necessary to collect to do analytics. We call this smart data. It's not enough to collect and analyse data, it must lead to action items like predictive maintenance. Today, we apply artificial neural networks in steel mills and also in car airbag systems. We call IoT as the web of systems, which acts as an enabler with us offering digital services and vertical software.



**Ashok Subhash**  
Principal Engineer, Samsung India

### IoT standards & Alliance

IoT is a physical network of things that contain embedded technology. What makes IoT possible is hardware miniaturization and lower BOM cost, advancements in sensor tech, long battery life of device, low power connectivity tech, IP as key interoperability protocol, advancements in machine learning and AI. The hindrances for IoT development include fragmentation, security and privacy, device and data management. The IoT consortium landscape we are defining includes connectivity standards, there are a plethora of communication standards, but we need something common. Since IPV 6 was meant for an internet kind of environment where the bandwidth is huge, it will not work for a constrained network like smart homes and smart offices. So we have standards like 6lowpan that compresses and fragments data.



**Shalini Kapoor**  
Chief Architect of IoT Cloud, IBM

## Innovating new Solutions with IoT Cloud Platform

The value of IoT is realized in four foundational areas, that is evolving new business models, optimizing operations and enhancing performance, building and managing IoT solutions, and connecting what matters. We use MQTT as a protocol, which is open source. We connect to different devices using standardized protocols, all available on open source. A platform is a place where you can collect the data, connect to the devices and analyse the data. All our services like predictive insights and predictive analysis are available in Bluemix and are launched using Bluemix so that it makes it easy for people to build use cases. Large OEMs like Bosch and BMW already use our lifecycle management tools, which provide an embedded software design. We feel IoT will have value when a lot of contextual data come into it.



**Dr. Biplab Pal**  
Founder & CTO, Prophecy Sensorlytics US

## Sensor Platform for Predictive Maintenance and Process Improvement in Manufacturing

Connected devices have been in existence since some time, the only thing we can do now is to make it cheaper, scalable and easy. The scalable part involves open source, and the cheaper part in silicon manufacturers. As a system engineer, we can make it easier. Data visualization layer in IoT consists analytical data, historical data, MRO, etc. We added another layer called the IoT simulator layer because we felt both real-time and non-real time data is important. Real time data is important in production, but non-real time data is important in learning algorithms. To update production, we have to test advanced algorithms in production. The most difficult part is installing sensors in machines, and that is why we have come up with machine wearable sensors with magnetic holding so that you can snap it on.



**Srikanth Gopalakrishnan**  
VP - Product Management,  
Head - Innovation Charter,  
SAP Labs India

## IoT ecosystem – platforms, applications, cloud

When we talk about IoT for India, it has to be local in flavour. If one takes the example of electric cars, the government has to provide subsidies. The battery systems that go into these cars are very expensive, so have to be available at a cost point that is affordable. Secondly, you need to have an ecosystem of people who have the capability to provide for charging stations. So basically for any IoT system to succeed, you need a whole host of people to come to the party. Otherwise, this endeavour is going to fail. Another example is textiles, which can now be 3D printed. You can pick a design, pick a cloth, and print it locally, which is customized textile manufacturing. This same thing is happening with Harley Davidson motorbikes, which has about 180 different variants. We are creating an asset intelligence network with Siemens for another customer. Social media connected people, now everything we are doing with machine to machine connectivity will bring in a similar revolution, which is far beyond what we saw with people to people connectivity.

## Smart Agriculture & Water



**R Amalorpavanathan**  
Deputy Managing Director,  
National Bank for Agriculture and  
Rural Development

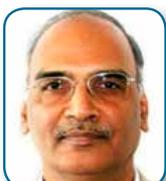
Any initiatives in agriculture have to meet the criteria of sustainable production, income to the farmer and nutrition security. Sustainable production means that the balance sheet of nutrition in the soil has to be positive as compared to what was present before sowing. We can apply IT right from selecting the correct seed to monitoring the plant growth and harvest. The temperature, water and sunlight have to be measured accurately for optimum growth of the crop. IT applications now help us to use approximately 10% of the water we were using before. We need to find variable solutions for smart agriculture in both controlled and uncontrolled atmospheres because our country has both high-tech and low-tech farms.

## Helicopter view of opportunities for Entrepreneurship in Agriculture:



**Ramanatha V Rao**  
GRSV Consulting Services

The world population is expected to reach 9.6 billion by 2050, and greater than 1 billion poor and hungry people live in rural areas. Agriculture productivity is declining in many countries, along with global food stocks in last 5 years. Food and nutrition security becomes very critical in this scenario, especially with the certainty of climate change. More than 85% of small farm holders are in Asia and sub-Saharan Africa. Most of the technologies available are for large scale agriculture, whereas in India we need tech for small-scale farmers. Also, our farmers grow several crops in a small piece of land. Nowadays, internet and cell phones have been used very effectively for agro advisories, which are either voice or text based. Smart phones are used to send photos and receive advisories about pests and diseases and suggest remedial measures. Future opportunities include estimate of seasonal crop area and yields, accurate assessment of yield losses to service fool-proof crop insurance settlements, real time and near-accurate prediction of rainfall, prediction of onset and severity of pest attacks, logistics for agriculture inputs in emergencies like delayed rainfall, drought, floods, etc.



**Ram Kaundinya**  
Current Director General, ABLE – AG  
(Association of Biotechnology-  
Led Enterprises, Agricultural Focus Group)

Challenges to agriculture have remained unchanged over a period of time in India. With climate change, water management has become difficult. Another issue is the low risk bearing capacity of farmers because profitability of farming has not improved. In villages where there is a technology and infrastructure bottleneck, we need mobile based technologies. Another problem is language meaning we have to handle multiple languages. We need predictive intelligence and cloud based platforms, but this technology driven solutions have to be given to the farmer in a cost efficient way. Right now, agricultural innovation, start-ups and funding is not very well developed in the field of agriculture. We don't have many agri-based funds in the country. We have to develop an ecosystem of incubating and developing start-ups to make them into regular business models.

## Expert Talk:



**Sanjay Podder**  
MD, Accenture

### Digital Agriculture

**Sanjay Podder:** Accenture is looking at agriculture as a big area of interest. We address it in two ways, precision agriculture which is more fine-tuned for developed nations and connected crop solutions, which is for small farmers. The idea for the precision farming is the same as connected crop solutions where we bring all the players in the ecosystem onto a common platform like farmers, bankers, agro-input companies, the only difference is that the platforms are a bit more complex and expensive. The success with this project led us to do something similar in fish fields as well.



**Nataraj Kuntagod**  
Vice President, Accenture India Labs

### Digital Agriculture

**Nataraj Kuntagod:** Over 80% of the food supply in Asia and Africa is done by small farmers who are the most vulnerable to climate changes. Big companies are looking at models that can engage small farmers. We need technology that is viable for everybody in the value chain. There is a lot of knowledge available in the agro input companies and agriculture universities, and there is a big chasm between the farmers and this. Today, we are almost 60% short of the world production of food grain, mainly due to overuse of fertilizers. There is no point in having connected crop solutions without connectivity. The goal of the project is to make sure that it is sustainable to all the parties involved including the companies, the dealers, farmers, field agents, etc. We digitally up-skill the field worker who in turn influences the farmer. The agro input companies load the information they have onto the cloud platform from where it is fed into an app on a tablet which works without connectivity, which is with the field agent. Based on this, he gives customized solution to each farmer.



**Dr. Subhrajit Bhattacharya**  
Program Head, UBD IBM Center,  
IBM Research – India

### Optimizing water usage in agriculture

California is a drought prone state, so water use efficiency is critical. Also, the grape farmers complain of quality of grape varying from one part of the field to the other. Our team implemented a variable irrigation scheme which improved the yield significantly. We used satellite imagery to map the canopy over the entire farm. This conveys information about which parts of the farm has a healthier canopy. Using backend analytics and this information, we can decide where to apply more water or less. This can be tied to sensors which monitor the soil moisture and nutrients. A histogram of yield values shows the difference in yields where variable rate irrigation was applied. The variability in the quality of grape also reduced by around 46%. The water use efficiency improved by 25% .



**Rajendranath Goswami**  
General Manager, Robert Bosch

### Transforming Agriculture through Technology

In India, the yield of farmers gets impacted due to climate change and various other factors. The available land is shrinking due to industrialization, so we cannot talk just about producing more but also must reduce wastage. We need to look at technology not just as point solutions but as interconnected solutions. Trending technologies include sensing technologies below and above the soil, you can use weather sensors and soil sensors and aerial survey technology like drones. Farm mapping happens at different layers like irrigation, soil fertility, etc. The next dimension is precision agriculture which works by integrating telematics and position technology. Another major trend is how we use big data and analytics. Technology infusion, while it comes at a cost, has definitive contribution in reducing costs and increasing yields.

## Panel discussion on Technology Led Innovation & Entrepreneurship in Agriculture

### Chair:



**K K Narayanan**  
MD & CEO, Metahelix

Today, agriculture includes lot of brain along with brawn. India is still an agrarian economy though agriculture contribution to GDP is only 14%. Indian agriculture has many peculiarities. On one hand, there is fragmentation of land, i.e., small holdings of land, but the scale of agriculture is huge. The arable land in India is second only to the USA. Cotton is cultivated on 12 million hectares, which is the largest in the world. The paradox is that this huge land is made up of small farmers, so we have to address this problem with solutions which will work on a very small scale. The challenges are to make technologies like water management and precision agriculture scale neutral. One way to make it affordable is to make it an aggregator model where the farmer need not own the machines.

### Panelists:



**Saragur M Srinidhi**  
PhD, President, Advanced Computing &  
Communications Society, IISc

When we talk about smart agriculture, I firmly believe it applies to farmers who have more than marginal holdings. My area of Saragur is in the Kabini catchment area, so we don't have water scarcity, but we have a problem of water inundating our fields whenever the Kabini dam is opened. Since we are close to Nagarhole and Ranganatittu, we have a problem of wild animals and birds destroying our crops. We cannot really do crop rotation because the birds will destroy one type of crop. As far as precision farming is concerned, it is more applicable to bigger farmers. Since labour cost has quadrupled, we have invested in a transplanting machine which does the work faster and more efficiently than human labour. Also, we use a de-weeding machine that works very well. Our biggest labour saving machine has been a harvester which though very expensive does the work of multiple men in just a few hours.



**Sanjay Bhatikar**  
Director, Monsanto Research Centre

The value proposition today has changed from developing high quality seeds and handing them to the farmer to helping the farmer get the best out of that seed, irrespective of weather, soil, market conditions etc. Now, we are able to predict pest attacks before it happens, which means we can provide the farmer with the right information. With the severe shortage of labour looming, autonomous vehicles will be a necessity. The challenge in India is how we get farmers to share technology and equipment to run their farms because none of them can afford to buy all these machines. What we are trying to do in small holder geographies is put GPS sensors on farming implements and instruments so that farmers can share their technology. Studies have found that when people share information, a collective intelligence emerges which is even better than expert advice.



**Dr. Prosenjit Bose**  
Chief Technology,  
Innovation and Business Development,  
Rallis India Ltd.

When we talk about technology for small farmers in India, there is always a question of affordability. Thus, we at Rallis group decided to come up with drone based pesticide delivery. Getting labour in the future will be difficult. Spraying pesticides using manual labour is both costly and hazardous. This drone has to fly for longer hours without replacing the battery. Hence, unless the life of the drone is at least 5 to 7 years, it won't be viable. We have another project called Drishti, which combines remote sensing technology and statistical data analysis to provide accurate and real-time updates and forecasts. It's satellite based monitoring of activities in the field. There are sensors planted in the soil which send information to remote satellites from where it is sent to analysis centres. The results are then conveyed to farmers, like imminent pest attacks, and they can spray the correct pesticide to prevent crop damage.

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**Sanjay Podder**  
MD, Accenture

## Keynote: Accenture Tech Vision and Open Innovation

Tech Vision is an annual exercise at Accenture where we talk about the major trends that will disrupt businesses. We talk to CXOs, academia, start-ups, entrepreneurs, etc., and set up an advisory board of about two dozen members who come up with recommendations that are broad and are actionable. We then create a story about how the industry is moving and how its going to look like in the future. In 2013, we made a prediction that every business in the future would be a digital biz, if you have to survive and thrive. In 2014, we came to the conclusion that brick and mortar companies with become digital disruptors due to their deep pockets and vast resources. This year, we say that however big an organization is, you cannot do it alone. Today, intelligent organizations are leveraging start-ups outside their four walls to speed up innovation, this is called open innovation.

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## Panel discussion on Supply Chain in IoT enabled Digital Agriculture

### Chair:



**M I Ganagi**  
Chief General Manager, NABARD

The biggest challenge for us today is to make agriculture viable. The two big game changers will be IoT solutions and farmer producer organizations. The Indian government has given us a fund to promote 2000 farmer producer organizations. If your touch point is FPO for your solutions, they will be more effective because this will turn out to be a huge collective involving more than 6 lakh farmers. The other important initiative is action research, mainly for bringing technology from lab to land. One example is tissue culture and other is self-help groups for women. We also do rural innovations, support mobile based advisories, good agricultural practises from soil to harvesting. We also have been identified as the implementing authority for green climate. The only way to increase the income of a farmer is to bring him into a sustainable supply chain mode.

### Panelists:



**Dr. P. G. Chengappa**  
Ex-Vice Chancellor, UAS

For most crops, we have reached yield stagnation in India. The cost of production is very high, and in many commodities we are not competitive. So the efficient use of scarce resources is important. Though technology is skill neutral, not everybody can use them. That is why many technologies remain in the lab and never reach the farmer. We need to apply an optimality criteria with all models being scalable. The farmers must be able to see the tangible benefits of the technology, only then will they adopt. If we look at the per capita consumption in India, we see that consumption of cereals is coming down, and the consumption of milk and meat products are going up, so we need to look at livestock production along with crops, that is why integrating farming solutions is apt. We need to have end-to-end solutions since our supply chains are very fragmented, being highly crop specific and location specific.



**Siva Sivakumar**  
CEO, Nimble Wireless

In India, one-third of our children are malnourished, and roughly the same number is not vaccinated. Still, food worth \$2 billion is wasted along with a huge number of vaccines. There are a few key factors that contribute to this wastage. One is the cold chain infrastructure, the ability to store, transport and sell temperature sensitive products. The second problem is frequent power outages, so that even if cold chain infrastructure is available, lack of real-time monitoring of temperature will lead to 25% wastage. We provide an end-to-end industrial IoT solution for cold chain monitoring. Products include fruits, vegetables, meat, milk and milk products, and pharmaceuticals all the way from harvest to transport to retail outlets where they are sold. Our smart wireless sensors monitor temperature, humidity and other critical parameters. They send data to the cloud, and an app sends alerts to the food, pharma and logistics companies to take action before their products get spoilt.



## IoTNext Innofest - Conversations with leading startups

### Chair:



**Sharad Sharma**  
Co-founder, iSPIRT

IndiaStack has not been yet put in the public domain, but elements of this have been known for some time. The entire IndiaStack team are very complimentary, one brings architecture skills, another brings product skills in a very collaborative effort. In this panel discussion, we are going to have several interesting conversations where you will learn about the largest IoT network that already exists. We will also talk about a new IoT initiative which is very large in its scope. We are going to hear four inspiring stories about start-ups and the IoT initiative, which is very large in its scope and then have a panel discussion outlining new developments going to come.



**Pramod Varma**  
Technology Architect,  
Advisor, Mentor, Ekstep

### India Stack - Cashless, paperless and presence-less service delivery will be the future of India

Since 1995, many layered innovations happened independently which was a non-linear disruption. These independent layers were designed so that someone else could innovate on top of that. An excellent example is Aadhar, where people are identified on a digital grid. IndiaStack provides layers upon layers of open APIs. These are cashless, presenceless and paperless, for example the next generation tax platform is going to be completely API based. That means when you can integrate data directly into the system, there is no need of a portal, export-import etc. India will go from being digitally poor to being digitally rich very fast. Machine algorithms will replace decision making processes, which is great because people want friction-free service delivery.



**Dilip Chhabria**  
Co-founder, Team Indus

### Exploring space

The technology we are building is an autonomous landing spacecraft which does data analysis and self-correction. What is also interesting is that the 600 kg payload which leaves the earth becomes 200 kg by the time it lands on the moon. We have a 100% total local integration, we have the most compact spacecraft. All the qualifications and testing are taking place here in India, and this is the fastest concept to completion. Typical space missions take anywhere from a decade to two decades, but we will be just 5 years into the mission when we launch.



**Viral Shah**

Founding Partner, Julia Computing

## Open-source, high-performance dynamic programming language for technical computing

Julia is becoming the standard language for scientific and parallel computing and also increasingly for embedded computing. There is a looming crisis in terms of 20 billion IoT devices by 2020, which raises the question about who is going to write programs for these devices and how. Lots of sensors will run complex algorithms, so a low level language will not be suitable. Julia is a mathematical language, which is common for engineers, computer scientists, data scientists. A strategic decision facing the industry is that with the various platforms emerging, openness and ease of programming is not addressed. The industry needs common platforms, which are open and neutral, operates on devices as well as cloud and can be universally adopted.



**Sridhar Reddy**

MD, Savari Networks

## Savari's V2X - Make the roads safe, smarter & greener

Worldwide transportation statistics show one death every five minutes on the road. We build collision avoidance systems based on GPS and wireless communication systems. We enable vehicles to say Hi to other vehicles, see nearby cars and talk to roadside infrastructure. The basic building block of this tech is called V2X, vehicle to anything communication. You need secure GPS, secure wireless transmission, having CAN data is an additional plus. An autonomous car is expected to generate 2 TB of data per day. There is no way all this can be uploaded to a cloud and processed, so lot of that has to be mined locally itself. The effect of profound disruption will affect many sectors in the automotive industry.



**Charan Malemarpuram**

Senior Developer, Logistimo

## Mobile supply chain & logistics platform for rural emerging markets

A supply chain is basically a flow of materials right from procuring raw material to the time it goes into the factory and stocking it in the retail store. Healthcare was the perfect sector for us to begin, and our overarching goal is that every child in this entire world gets vaccinated. The challenges in getting to the last mile include infrastructure where is no good road connectivity, no electricity. Technical hassles include no internet, scarcity of talent. Business challenges include fragmented supply chains. Our solution is to digitalize everything, bring symmetry across higher echelons where everybody can see everything in terms of stocking. We have a multichannel transmission protocol with offline mode to seamlessly enable logistics which can sync via SMS or background where no internet is available.

## Panel discussion: Catalysing the Indian IoT Ecosystem

### Chaired:



**Arvind Tiwary**  
Chair – TiE IoT Forum

IoT in India is a new concept with no models to adopt. There are a lot of industries with plenty of money like commercial supply chain, building industry where this can be applied. Some like public health and agriculture present viability issues. If you have good platforms and simple APIs, other models can build on it and that is how you can scale. There are around 280 start-ups working on IoT with a majority of them being in software.

### Panelists:



**Mariasundaram Antony**  
General Manager  
GE Power India Engineering

Going by the presentations here, I have little doubt that one day we can stake our claim to being the IoT capital of the world. GE is combining domain knowledge with digital data, we are very happy to be partnering with IESA to drive this whole perspective. A third of the world's electricity is being powered by GE equipment, so imagine the sheer volume of data we will have access to. We have to create customer outcome using a combination of domain knowledge and digital. We are launching an open platform called Predix where everybody can host applications. We are currently working on how to predict the amount of energy we can feed into the grid using our wind farms. In healthcare, we are trying to get experts access to rural villages.



**Dr. Pramod Varma**  
Technology Architect,  
Advisor, Mentor, Ekstep

We currently have 100,000 plus biometric sensors on the network. We believe the big one will be Iris biometric sensor on every phone. Its accuracy is very high, and we have really pushed the boundaries of biometric sensor technology, especially on the capture side. Our protection comes from preventing unauthorized devices from capturing biometrics, preventing biometrics to be replayed on the network. We have created a data of registered devices, which will encrypt on the sensor. We are also implementing biometric locking, which means only the user can authenticate the biometric. We have also started a new project, which is vehicle identity for every vehicle which is completely API based.



**Viral Shah**  
Founding Partner, Julia Computing

We actually started Julia because we were frustrated with the fragmentation in the software. If it is a large organization, it might be possible to have different teams work in different languages, but in a small team it was huge problem. So we thought if we could have one language that was fast and flexible, it would work better. That is how Julia was developed when we tried to solve something for ourselves. While universities in the West are using Julia in a big way, in India we are still not adopting it. At an educational level, we should be teaching our students concepts and tools that can stay with them for life.

# SPEAKERS

Day 2: Dec 10, 2015

## Scaling up to 1000 Smart Cities



**Ashwin Mahesh**  
CEO, MapUnity

Building smart cities one by one around the world is not very smart. We need a model that can rapidly scale to every city on the planet. Should we build smart cities if there is no money to be made by doing so? A smart city basically has a smart government with informed citizens and businesses able to leverage platforms to make their own smart solutions. We have built a ground water mapping platform to see what the shape of the aquifer below the city is. This same model can be replicated in the different cities across the country and the world with the exact same platform. So basically we have to have one platform with three uses, it has to provide info to the public, it has to be usable as an administration platform by the government, and provide solutions for businesses. So instead of cab companies having GPS tracking for their cabs, schools having for their buses, BMTC for some of their vehicles, we need a common platform which all of them can use. Mapunity is building Technagara, the smart cities platform which is social, commercial and administrative.

## Keynote



**Terri Bresenham**  
President & CEO,  
Sustainable Healthcare Solutions, GE

We all see that global economy has slowed down over the last couple of years. It is more volatile geo-politically, and our innovation cycles are increasing rapidly. What happened when 1 billion people get connected? Entertainment is streamed, social marketing emerges, communications are mobilized, IT arch is virtualized. What happens when 50 billion machines are connected? Operating time is virtualized, analytics become predictive, systems self-heal with automation, monitoring and maintenance is mobilized, decision making is decentralized. We have launched a GE health cloud which is destined to plug in 500,000 machines which will bring information out of those machines and aggregate it and then allow for digital analytics. The five key areas we are working on are precision medicine, radiology and pathology, bioprocess manufacturing and cell therapy, and global local mobile. We are extending ourselves to being an ecosystem provider rather than just a technology provider.

## Keynote on Smart cities - state of the union



**Dhiraj Wali**  
Vice President  
Robert Bosch Engineering &  
Business Solutions Ltd.

A smart city is crossing silos, creating an informational and operational web interconnecting disparate systems to optimize performance and create new business models through integrated technology platforms. In a smart city, the citizen is at the centre. All the solutions and services must make sense to that citizen. We need smart cities for economic development, optimize city use, sustainability and quality of life. The transport usage increases by 25% if we have all the systems in place properly deployed, 30% reduction in search time for parking, the average speed for traffic goes up by 20%. A smart city creates value through new services, additional revenues, time, effort and energy saving, enhanced quality of life for citizens.

## Keynote on Connectivity and Network options for Smart Cities



**Joy Rajan Cheruvathoor**  
SVP - Strategic Alliances &  
Machine-to-Machine Strategic Alliances,  
Vodafone Business Services

The institution of engineering and technology, IET, is a 144-year-old global professional body based in the UK, second only to IEEE in terms of membership. We offer a wide and deep range of engineering knowledge resources. We offer international accreditation for engineering courses and membership for working professionals and students. We recognise engineering excellence with awards and scholarships and provide a platform for industry and academia to exchange ideas. The future of things is connected, and IoT is growing at a humongous pace. The whole concept of smart city would come around smarter buildings, smarter transportation, healthcare, education, administration, tourism etc. The type of networks needed to deliver the smart city services would include the wide area network, WAN, covering large spaces usually provided by telecom companies, metropolitan area network MAN which covers the city area, local area network LAN, personal area network PAN. We will see highest growth in the shorter range areas, so ideally we need a sensor that can transmit over longer distances at lower power. The LPWAN will add a significant chunk to the growth of IOT.

## Keynote on Smart city implementation



**Anupama Murali**  
Smart Cities and safer planet domain  
Architect, IBM

IBM calls a smart city based on intelligence, interconnected and instrumented. Intelligent means the city should be able to respond to the surroundings automatically, not be manual driven. When you want something to act intelligent, there has to be an instrument to guide it to act intelligently like sensors or actuators, which are part of IOT ecosystem. The different domains that can be made smart is city planning and operation, buildings, energy like smart grid, smart water and transportation, healthcare, education, public safety, government and agency administration. Enabling technology for smart cities include CAMS that is cloud, analytics, mobile and social. Cloud reduces cost by leveraging cloud, decreases time to deploy, increases accessibility. Analytics integrate and analyse large volumes of data, identify predictive insights, improve decision making across diverse domains, realize the potential of IoT, empower leaders and citizens with real time insights, increase citizen engagement, obtain crucial data and capitalize on interconnectedness.

## Expert Talk:

### Smart City in the Heart of Silicon Valley



**Jonathan Reichental**  
CIO, City of Palo Alto

What a lot of cities are doing is that they are using 20th century solutions for 21st century problems. In the old world, the traffic signal changed on a regular schedule. In the new world, the traffic signal has gleaned information about the surrounding traffic, your car sends information to the signal, and it goes green if it is safe for you to go through. So the traffic signal works in concert with the traffic and not an independent system. Increasingly, technology is playing a central role in delivering services to the community, lowering the cost of services, and making them more efficient. In Palo Alto, we connect homes to a smart grid so that your energy consumption is data that can be collected, aggregated and analysed. You can compare your power usage to your neighbours. This can influence your behaviour and make you more energy efficient. Optimizing each of these services is the underlying drive for smartness, creating a smarter set of services that talk to each other, uses sensors to collect data, and uses IoT to connect data and people.

## Cyber Security Solutions for Smart Cities



**Douglas John Gardner**  
Chief Technology Officer,  
Sypris Electronics & LLC

When you look at the PKI architecture, you have a lot of keys that are being protected. Fielded IoT systems require a layered scalable solution with circles of trust architecture. The end-point devices, at each layer of architecture, need levels of identity and levels of trust so that you can manage it properly. To be able to use the data, you need really good protection of the identity of the devices. In conclusion, IoT security needs a hardware root of trust. At any point if you comprise the below layer, the layer above is done. End point to end point security is required. Identity must be intrinsic and not assigned. Typical PKI periodical certificate renewal process must be reduced or eliminated. Silicon and system providers that include an easy to use security framework will dominate the IoT market.

## Security & Surveillance for Smart Cities



**Aniruddha Deswandikar**  
Director  
Microsoft Technology Centre, Microsoft C

We have a technology centre where customers walk in with typically enterprise problems like productivity related and probability related. We provide and showcase solutions to them so that they can make informed solutions. With IoT, security and surveillance is of prime importance. Because the city has grown so drastically, manual security costs are skyrocketing. Terrorism is a global threat. Now every country is at danger, more public services increase security surface area. Surveillance today is very complex. Most of our customers want all their security cams to be connected to a central unit, which then sends data to cloud storage from where it is analysed. The advantage of this centralized processing allows for centralized processing and analytics. Accessing videos is easier as it is centralized. The cons include it is still very reactive; bandwidth costs are very high, and smart city data could be very huge for post processing. So it is not a scalable solution. We need a distributed architecture for this.



**Ravi Manik**  
Director  
Business Development, India and  
SE-Asia, Broadcom

How IoT evolves from this point onwards is based on business models. What is critical for entrepreneurs is to have an idea, develop it, deploy it and see that it works and tweak it continuously in an agile fashion. Today's designs become tomorrow's business models. Today's switch becomes tomorrow's autonomous systems, which will understand the pattern, presence and proximity of things and people around and then make decisions. Today's single function apps will become multi-function apps. They will grow to be able to collect data, process and analyse in the cloud and make decisions in real time. It will be precise, real time and scalable. All of these will come together with connectivity, the processing in the cloud, and sending the results to the user. We have a new product with cloud IoT sensors and MCU, we have low-power Bluetooth with 4 years of battery life on a single coin cell. We are building the Lego blocks, which you need to apply to your vision.

## Supply Chain 4.0 in Smart Cities



**Dr. Freimut Bodendorf**

Director, Institute of Information Systems,  
University of Erlangen-Nuremberg, Germany

Supply chain 4.0 covers the whole value creation process from raw materials until it reaches the final customers. Supply chain 4.0 makes use of innovative technology like smart objects, smart sensors, smart devices to create solutions for commerce, retail, sales, logistics, etc. The buzzword is autonomous self-organizing systems, so that the supply chain runs by itself. It will be service centric, business model centric, solution centric. M2M solutions are a small part of a much larger concept. Supply chain 4.0 not only focuses on machines but also on process, people, products and customers. Visibility, velocity and responsiveness of the supply chain are driven by smart objects and IoT. There is a strong connection between cyber-physical and supply chain management goals. In order to support application integration, a whole bunch of new and converging technologies are needed. Implementation of supply chain 4.0 has to be treated as a complex innovation and technological management problem. In order to implement supply chain 4.0, companies have to closely collaborate with others in order to share and combine competencies. Business ecosystems have to be built up. Using descriptive analytics, you can do predictive analytics and provide decision support systems to suppliers, thus integrating the flow of persons, products, vehicles, energy, information, etc., in a smart supply chain.

## Smart city platform



**Arun Jose**  
Altix

For a smart city to really work, we need to have open standards which enable multiple people to hop onto a smart city network, and a collaborative infrastructure by the city themselves. All the players, including the government, entrepreneurs must come together and work out solutions. Smart city is a way to get people to communicate to people, everything in between is a distraction. Business models that encourage entrepreneurship include all the players working together to figure out the smart city plans for the next five years, figuring out things that have to be done and working a timeline. For smart city collaboration, no one person can know all of it but if there are right people in the right places, the data scientist gets access to data the city is producing and can write algorithms to save money. We need to look at the reality and look at what the market suggests but understand what it takes to make a smart city work.

## Security Implications & Solutions for IoT



**Janakiraman**  
nxp

The examples of smart city solutions are myriad including transport and traffic, shopping, smart homes, smart infrastructure, e-government, smart grid, smart buildings, etc., but all these can be hacked. The security cams aimed at proving security have been hacked multiple times. Hacking also happens in an industrial environment. Stuxnet, the virus brought down a nuclear reactor. Beckstrom's law of cyber security states that everything that is connected to the internet can be hacked, everything is being connected to the internet and so everything is vulnerable. Security is defined by the weakest link that you have. You need to manage secure firmware upgrade, you need encryption of data, secure storage of credentials, end to end security for IoT devices. You need firmware authentication to ensure only trusted codes run in the systems, device and user authentication using certificates and shared secrets, local or remote authentication depending on application needs. Security also needs secure storage, tamper-proof hardware, protection of user and device authentication credentials, protection of server credentials, confidentiality and encrypted firmware.

## Panel discussion on Accelerating Smart City adoption

### Chair:



**Ashwin Mahesh**  
CEO, MapUnity

Most private companies capable of creating platforms for smart cities are looking to make proprietary platforms, which would help their businesses. If the city has to create a platform, very few cities around the world would have that capacity. We need private players to come together to create a platform and host it in an open environment.

### Panelists:



**Chetan Maini**  
Mahindra Reva

The fundamental thing is that we need a platform that has a lot of hygiene in it, both from an infrastructure point of view and people's mind sets and attitudes. We also need to look at things more holistically, like creating an android for cities. We need local solutions on a common framework because of the unique challenges each city faces. To accelerate, we need to showcase results and show it doesn't need five years for everything to come together. We need to connect all the initiatives that are happening. For example, we are looking at 5 million electric vehicles in the future. If all of them could give us solar power, we could add a lot of power to the grid and solve power issues. We are looking at open architecture platforms to give us an advantage.



**V Ravichandar**  
CMD, Feedback Business Consulting

What are the key challenges in accelerating IoT in a smart city space? The 800-pound gorilla we haven't dealt with is the government. In India, everything is controlled by the government, like transport and power. We have a 1980 motherboard, and we are talking about a 2015 processor being deployed on that motherboard. We won't have traffic solutions unless we embrace public transportation on scale. The solution definitely lies in building a set of platforms as freeware or shareware and making that available to the government. The reason TenderSure roads happened is because we gave it to the government and told them to make it available.



**Dr. Ishwardutt Parulkar**  
CTO, Cisco

There is definitely a need for a common platform, but the solution could be complex. We need to have standardization among the subsets. It will start with a vendor based approach, which is happening right now. There will be some consolidation. Every smart city has its unique requirements. Their drivers and business models will be different.



**Jose Polackal**  
Business Development Executive, IBM

I would like to look at the procurement practices in our country. There are niche players who are extremely competent who have been thrown out because of the archaic procurement practises. Before a government delegation travels out of the country to see how a smart city works, they must look at the procurement that happens in the global market. Vendors are empowered in a collective engagement to define the procurement protocol. To catch up to the western world, we end up procuring substandard material. How can we integrate different cities in a state on a state owned platform? We need a cloud hosted platform which can be completely managed by a vendor. When TCS took over the business process of passports from the government, passport seva kendras, PSKs, became so flexible and agile and fast. The government must own only the signatory rights of a process and hand over the actual running of the process to a private vendor, that is the only way we can accelerate the smart city initiative.

## Panel discussion on Academia-Startup connect

### Chair:



**Prof. Sadagopan**  
Head, IIIT-Bangalore

Bangalore is not only the software capital of India and perhaps the world, we are also the science capital and the technology capital. There is a notion that hardware cannot be done in India. China has done it, but we can't. We are proud of the fact that lots of hardware from China runs on software from India, but we need to change the message that start-ups can also be about hardware. In addition to engineers, we also must produce other scientists.

### Panelists:



**Dr. Charit Bhograj**  
Founder, Tricog

Medicine and technology have a common goal, to make your lives better. But technology has advanced to a phenomenal extent, and unfortunately medicine hasn't. Most of the tools and systems we use to treat people are 200 years old. The phone in your pocket has more computation than what is used in an ICU. Five million people die of heart disease in India, 50% of those people can be saved. 90% of all medical resources and people serve 15% of the people in India. The only way to bridge this gap is through technology. TriCog is a collaboration of medicine, software, algorithms and hardware. It diagnoses when you were having a heart attack and need to take a tab of Disprin. Thanks to technology, we are at 160 different places in small towns and villages, and 2000 people with acute heart attacks have been treated. To ignite minds, we need more mentors to help cross the divide between medicine and technology.



**Dr. Ashok Shettar**  
Principal, KLE Technology University  
(formerly known as  
BVB College of Engg. & Technology)

Hubli-Dharward is about 400 km from Bangalore, whose main occupation is trade and commerce. Most of our graduates migrate to cities like Mumbai and Bangalore because there are no new age companies. To change this scenario, we held an IT meet in Hubli in 2006, but nothing came out of it. No company was interested in investing because they felt we were not ready. We didn't have an incubator ecosystem, and we wanted to start one. We didn't have a big research base or innovation base that could support start-ups. At the same time, due to absence of entrepreneurs and new age companies, there was nobody to mentor our students. So we launched CTIE, the Centre for Technology, Innovation and Entrepreneurship. The uniqueness of this model is its two-pronged approach. The first prong is attracting serial entrepreneurs from big cities who want to move out by creating a value proposition. Once they come into the campus, use their strength to create an entrepreneurial ecosystem in the campus. They bring experience and their network to inspire the student community. Today, there are 35 start-ups in our campus. Student teams work with these companies on real life problems and projects. The attraction includes not only the space and facilities, but also the frugal means to do business. We have created research clusters who partner with the start-ups. Now our challenge is to integrate research and innovation with the entrepreneurial ecosystem. Most of the companies belong to IT/ITES, composite materials or biotech. We have so far not been able to support any physical product company basically because of a lack of support system. Now we are setting up facilities such that a person with an idea for an electromechanical physical product can use design tools, 3D printing to dye making for the product.



**Prof. Partha Pratim Das**  
Department of Computer Science and  
Engineering, IIT-Kharagpur

IIT Kharagpur has been involved with promoting startups for quite some time. We are focussed primarily in technology, critically tech enabled. We have a venture funding option and fund up to 15 lakhs. We are very proud of our successful startups which are not many in number but making significant strides. We also study companies which are not successful, one reason they fail is because the core tech idea is not sound so you cannot build your product. But there are companies which do not succeed in spite of very concrete ideas due to factors which could have been avoided. It is there that academia can play a big role. One of the major factors that pull down entrepreneurs in India is the social factor. Parents send their kids to IIT with the sole objective of landing a good job. Several fail because our society doesn't groom our kids to take risks. There are many critical factors necessary for a startup to succeed, the most important of which is mentoring, both technical, psychological and in business. IIT Kharagpur has introduced the concept of sabbatical in studentship that allows the students a gap of up to 2 years.



**Prof. Rakesh Basant**  
Founder - Centre of Innovation, Incubation  
& Entrepreneurship, IIM-Ahmedabad

Incubation requires mentoring, finance and a host of other linkages. Most of our universities are not effectively multi-disciplinary. Multiple technologies come together for innovation. Increasingly, students are keen to use technology for social ventures. Innovation and entrepreneurship has multi-disciplinarity at its core. One way of looking at multi-disciplinarity is bringing together science, technology, management, design, etc. Another way is to look at the customer at the bottom of the pyramid and understand his social situation which would require social science and humanities. In India, we cannot claim to have a single large university which has good quality people across disciplines. Very few universities allow students to take courses across departments. We might not be able to create universities with the calibre of the west in the next 10 to 15 years, but fortunately we have very good quality institutions in different disciplines coexisting in the same cities. If these institutions can come together to do projects, they can harbour innovation. We will have to work toward this goal since the silo culture is so deeply entrenched in our psyche.



**Satish Mugulavalli**  
Co-founder, RevvX

People are of the notion that hardware is hard, but I say hardware is hard because software is easy. Over the last few years, we have seen a tremendous explosion of maker space. The cost of general purpose hardware has dropped significantly and that has encouraged people to come into this field. Students, who have exposure to incubators and mentoring while in college, lose it when they graduate and leave the college. So they lose interest or think they can build a working prototype quickly, but then realize nobody is ready to invest. Students who build low cost working prototypes have no clue about how to design and build an industrial model and take it to the market. What we do is take a detailed look at the prototype, connect the students with mentors. What we try to do is remove the manufacturing risk of hardware start-ups and make them a lot more investible. We are also building a platform which will rank teams that win Hackathons and Makeathons so that companies are a lot more confident in investing in them and in the future, these teams can be potential start-ups.

## Testimonials and Feedback

### **Colm Prendergast, Analog Devices**

Summits like these provide an invaluable platform for various players to come together to share ideas.

### **Mike Byre, Analog Devices**

This is a brilliant effort by the organizing partners to promote an IoT ecosystem in India.

### **Dr. Biplab Pal, Prophecy Sensorlytics**

Good participation, many players in the field, excellent networking opportunities.

### **Srikanth Gopalakrishnan, SAP Labs**

I think this is a good effort to bring all the stakeholders together and get them talking.

### **Dr. Prosenjit Bose, Rallis India**

I am happy to see the tremendous participation, and think that this is the right way to go.

### **Sanjay Bhatikar, Monsanto**

The halls seem to be full, and there is good involvement of all participants.

### **Sridhar Reddy, Savari Networks**

We need many more such events to really get the momentum going.

### **Ravi Manik, Broadcom**

I think it is a very good effort, and it will achieve the objective.

### **Yannis C. Yortsos, Viterbi School of Engineering**

It's my first time, and I don't know what kind of participants are there, but seems to be a large crowd which is good.

### **Prof. Rakesh Basant, IIM Ahmedabad**

I think events like these help open up a dialogue, but we need more participation.

### **Satish Mugulavalli, RevvX**

Well organized and there seems to be good participation.

### **Shyam Rajan, GE Healthcare**

A very good effort and hope to see many more of these.



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