



# Smart Education – Making education Efficient, Affordable and Reachable for India.

## A Position Paper



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## EXECUTIVE SUMMARY

As per Markets & Markets [1], research Smart Education and Learning market is estimated to grow from USD 193 Billion in 2016 to **USD 587 Billion by 2021** at a CAGR of 25%. Almost half a trillion-dollar market by 2021 is very lucrative for anyone and given the potential size of Indian education system it should ideally have a very large piece of this pie. Out of all the contributors, the research says that Learning management systems (LMS) will grow the fastest among all. However, within IoT bucket the innovative and interactive hardware device market will majorly drive smart education using connected technologies such as smart boards, digital pen, etc.

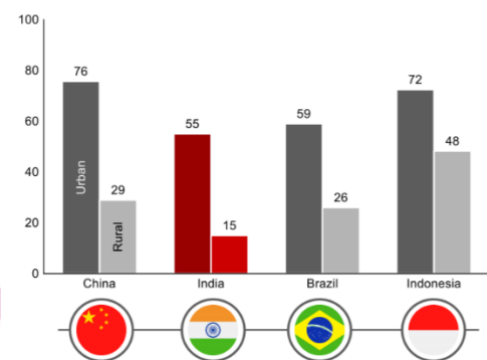
India has the second highest number of Internet users (390 million) globally but with substantial room for growth. India expects another 500 million users to come online over the next decade, which presents immense opportunity for smart learning product providers to tap. Many of these users will be in tier II, III towns and rural areas where the penetration of formal education is still low.

Our research for smart education highlights multiple value addition that IoT and related technologies can offer for education sector covering all modes of learning from classroom to virtual and from academic to sports. Use cases such as smart boards, student attendance systems, student and staff safety and tracking, crowd and emergency management have already seen good uptake in India. And innovative solutions using IoT such as smart chair, connected sports equipment, athlete performance tracking, smart wearable, simulation using augmented reality and others show a lot of promise but at same time are not affordable, scalable, and readily available in the Indian market ecosystem.

We **recommend** that educational research and application of IoT in education can be widely adopted given following three steps are taken. **First**, being that Government provide incentives and the regulators set the norms for rapid adoption of technology in education delivery and content retention there by motivating both the private enterprises and start-ups to make investments in this sector. IET IoT will help to formulate policies and standard working closely with the stakeholders. **Second**, that IoT solution and service providers focus on the basic need of the respective use cases or challenges such as affordable mass education or tracking athlete's performance rather than smart ergonomic chair which although adds value is unaffordable and not the need of the hour. For this effort IET IoT plans to setup experience centers at universities and colleges and also provide technical knowledge and engineering excellence. **Third**, and the last is for the educational institutes and education service providers to collaborate closely on identifying common trends and patterns in technology adoption across India and replicate best practices there by generating the demand for the sector.

### Rural vs. urban: rural penetration much lower than urban

Internet penetration by rural vs. urban (2017)  
(%)



## OBJECTIVE OF THIS WHITEPAPER

Key objective(s):

- **Raise awareness** about the smart education concepts covering education delivery modes such as classroom-based learning, experiential learning, project-based learning, physical education, sports and athlete trainings, gymnasiums, remote learning, online among other mediums.
- Highlight **Key Challenges** for the technology adoption, regulatory support, industry standards, and the ecosystem within the context of IoT.
- Give **Recommendation** to all the stakeholders on how to leverage and benefit from technology such as IoT, AI, AR and others to enhance the learning experience and the outcome or the impact of the education.

## TECHNOLOGY IN EDUCATION

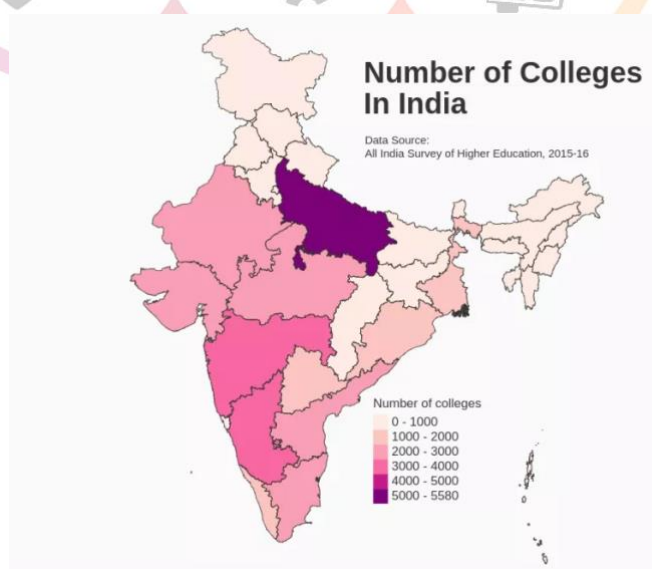
With a population of more than 1.32 Billion, India is the second most populous country in world. With such a high population India also consist of one of the highest numbers of institution for formal and informal education. According to the latest report on the All India Survey on Higher Education, there are 799 Universities, 39,701 colleges and 11,923 standalone institutions in India.

As per the Ministry of Human Resource Development (MHRD) data 2011- 2012, there are 1.3 million schools in India and probably even more now. Even with such a large number of institutions, literacy rate of India is only 64%. We can see in map that Uttar Pradesh is the state with the highest number of college but a literacy rate of only 69.72%. One of the major reasons behind this is less technology innovated schools' classrooms and playgrounds [\[2\]](#)

These stats indicate that the market size of education is huge and hence the potential of leveraging technology and specifically smart technologies is immense. As India consist of

about 17.4% population of the world, it is one of the most widespread and most attractive market for smart education.

Before delving further let's understand what is smart education and for that it's important to understand IoT or M2M in a layman term. Internet of Things (IoT) is an ecosystem of connected (*connected to internet either directly or indirectly*) objects coupled with sensors, that capture or sense



information in their environment, which is then stored, processed and analysed either at the device itself or in the cloud (or remote system) to create value. Plethora of example of IoT applications are in existence today, from a smart home where you can remotely manage and monitor your appliances to smart factory, where the entire shop floor is connected to the network and enables preventive maintenance through information captured from the machines, from the connected cars where the vehicles health information is transmitted through SIM cards for keeping an eye on the vehicle performance to smart cities where waste bins, water distribution systems, traffic lights, street lights, surveillance camera etc everything is connected to the internet and has some of sensors on them.

Smart Education when looked at from the lens of IoT or M2M has similar solutions built to enhance the learning of the subject, add efficiency to the training of athletes, enable remote monitoring of activities in the classroom, make schools and colleges more secured, track the attendance and monitor the crowd in the school in real time, etc.

**“Smart Education** is a set of technology-based solutions, which leverage sensor networks, cloud computing, artificial intelligence, augmented reality, internet and other smart technologies combined with engineering excellence to enhance the learning of the subject matter and to make education affordable and reachable to the target audience” – Vinay Solanki

Smart Education scope covers the learning modes, activities inside the schools or colleges, activities related to academic projects or research, physical education trainings both outdoor and indoor, anywhere access to learning and related skill development. For example, **Smart Classroom** is a typical ecosystem for smart learning, and it is the high-end form of digital classroom. The availability of high speed cellular technologies such as 4G or wires connectivity such as Wi-Fi coupled with tablet PCs and smart phones makes the communication and learning system easier. In engineering education, these sophisticated technologies can bring immense advantages to the methods of delivering and acquiring knowledge.

Online learning software, e-learning tutorials, multimedia lessons, educational websites, online training, online two-way conversation, video chatting, and online classes are some of the common available methods of education delivery and they are becoming more affordable and available due to both enhancements in the speed of connectivity, reducing prices of internet and entry of multiple start-ups such as BYJU's. This e-revolution makes the concept of “e-class” or “smart class” possible but with the need to train the resource persons such as school teachers, academicians and administrative staff.

Likewise, IoT or connected technologies have applications in smart desk, connected sports, smart content delivery, student tracking, attendance management, student and teacher safety, affordable education, smart workshops, etc.

## ECOSYSTEM & VALUE CHAIN

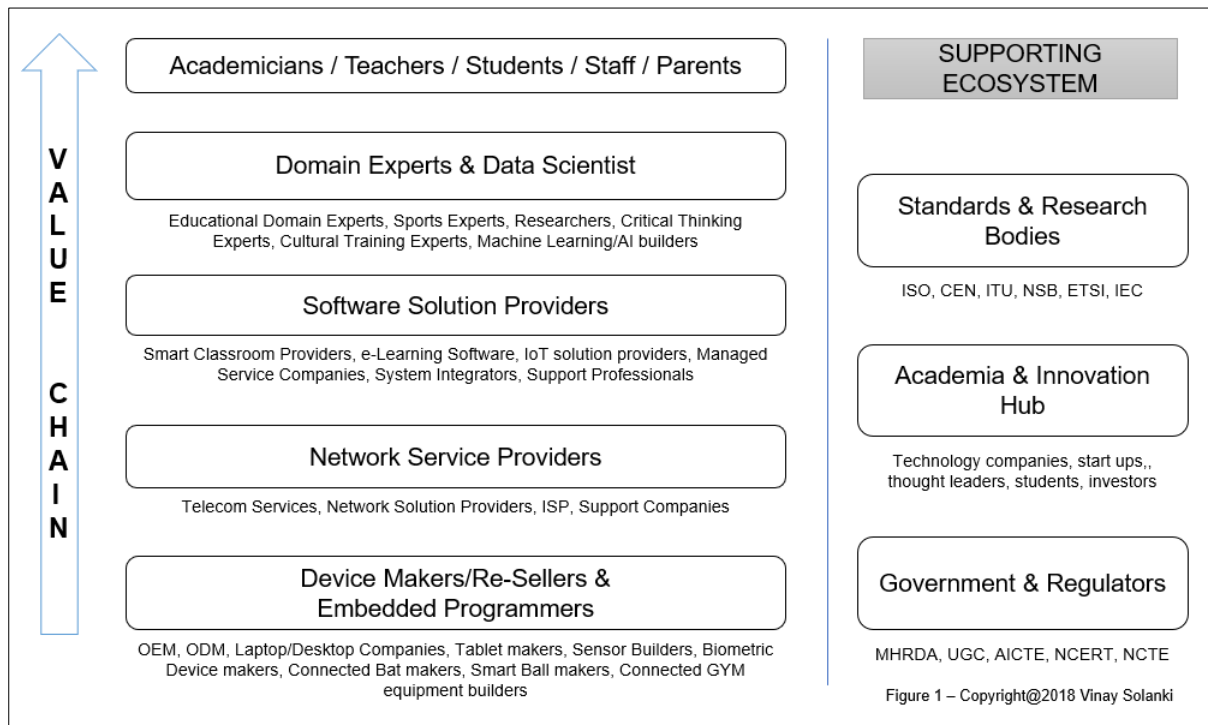


Figure 1 above is a one of the possible representations of various ecosystem stakeholders of smart education and learning industry. For any smart solution for education sector to be classified as an IoT or M2M solution, following stakeholders will some role:

### DEVICE MAKERS

IoT solution works on top of connected device which may or may not have a sensor on it. However, IoT hardware and the program running on the hardware to make it work is crucial piece of the puzzle. Device makers include companies such as chipset makers (Intel, ARM, Broadcom), Original Equipment Manufacturer (Apple Smart Watch, Fitbit fitness tracker), Original Design Manufacturers, Smart Phone/Tablet/Computer makers (Lenovo, HP, Apple), various companies in China or Korea who make sensors, biometric device makers, RFID tag and RFID reader makers, and so on. Specifically, for smart solutions in sports and trainings would be companies who make connected tennis racket (Babolat), connected basketball (Wilson) [3], etc. Unless sold device-as-a-service, these players typically make one-time revenue by selling the device to the IoT solution provider or direct to customer.



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## CONNECTIVITY PROVIDER

Next comes the companies which offer connectivity for the IoT solutions such as traditional telecom companies offering 2G, 3G, 4G networks (ATT, Vodafone, Verizon, Airtel, Telefonica), low power wide area network service providers that offer LoRa (Tata Communication, SenRa), SigFox, RPMA (Ingenu), and companies that support short range connectivity such as Wi-Fi, BLE, NFC, ZigBee, UNB, UWB, etc. Connectivity providers charge for a monthly or quarterly rate but they make revenue throughout the lifecycle of the IoT solution.



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## SOFTWARE SOLUTION PROVIDER

Most important set of stakeholders and players are the companies building the solution, deploying the solution, stitching the solution together, servicing, maintaining, operating and supporting. There are various type of players here including but not limited to cloud service providers (Amazon, Google, Microsoft), System Integrators (Infosys, TCS, IBM), Managed Service providers (HCL, Tech Mahindra), IoT platform providers (Aeris, Jasper, AWS IoT, Azure IoT Hub, IBM Watson), Support and Services companies, Consulting Companies (EY, KPMG, McKinsey), application builders (Smart Classroom, e-Learning, Monitoring and Tracking), start-ups, innovation hubs and also freelancers and domain experts.



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## DOMAIN EXPERTS

Value of IoT lies in the data captured and then regressively analyzed to derive value out of it. To perform analysis, you may apply regression or run a machine learning model on top of the data. Education industry domain experts play a crucial role here to add the required value by giving the insights and sharing the experience with the data scientist who can then build a software model that will be trained on the data captured by various IoT solutions. Some say, that the key part of the ROI on an IoT solution comes from the data and hence these set of players cannot be ignored.



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## CUSTOMERS/Users

In case of smart education, the main demand driver of the value chain who would pay for the solution or services is the customer or the end consumer. Educational institutes, colleges, universities, training camps, training institutes, sports academies, physical education bodies, associations etc. are some of the examples of the customer for such products. End consumer could be the students, teachers, administrative staff, trainers, parents, academicians, coaches, etc.



## Supporting Ecosystem

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### GOVERNMENT & REGULATORS

Various organizations which are tasked with fostering education and increasing the penetration of education are part of the government recognized or supported bodies and regulators. Example is MHRDA – Ministry of Human Resource Development - formerly Ministry of Education, is responsible for the development of human resources in India including the youth.

UGC – University Grants Commission of India (UGC India) is a statutory body set up by the Indian Union government in accordance to the UGC Act 1956 under Ministry of Human Resource Development, and is charged with coordination, determination and maintenance of standards of higher education. It provides recognition to universities in India, and disbursements of funds to such recognised universities and colleges. Its headquarters is in New Delhi, and has six regional centres in Pune, Bhopal, Kolkata, Hyderabad, Guwahati and Bangalore.



AICTE is the All India Council for Technical Education is the statutory body and a national-level council for technical education, under Department of Higher Education, Ministry of Human Resource Development. NCERT - The National Council of Educational Research and Training is an autonomous organisation of the Government of India that was established on 1 September 1961 as a literary, scientific and charitable Society under the Societies' Registration Act.

All such bodies are responsible to drive specific aspects of education and need to work together more closely to drive adoption of technology in education. As they are responsible bodies with the right ownership and authority under them, they will play crucial role to drive smart education.

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### INNOVATION HUBS

Smart Education needs a crucial support not just from the value chain ecosystem as described above and government regulatory bodies but also from innovation hubs such as communities, startups, event organizers, conferences, academic researchers etc. Increasing awareness of technology that can build support for smart education, raising the skill level of both the staff and students that will consume this technology, providing the hubs and workshops to build prototypes, executed conferences and bring all thought leaders under one roof. For example, IoT-NCR [\[4\]](#) a community of 6200+ members run monthly workshops, webinars and seminars focusing on enhancing learning for students, professionals and enthusiast on new age technologies such as IoT, M2M, Blockchain, AR, AI/ML, RPA, etc. They run this effort as a not-for-profit there by making learning reachable and affordable by all, specially students.

## USE CASES & SOLUTIONS

### SMART CLASSROOM

Technology plays a vital role in education. In today's competitive a student needs the skill sets, which are beyond subject knowledge and require concentration, assimilation power and retention memory. In this regard the role of smart class is quite important. Smart class was introduced by Educomp in India. **Educomp** is one of the largest education companies in India taking care of entire education life cycle of students. The company currently works with over 26000 schools and over 15 million learners and educators across the world. Educomp is India's largest K-12 content library of rich 3D multimedia educational content modules. It is HQ in Gurgaon, HR, India and the founder is Shantanu Prakash with 10 offices across India.

The company works closely with schools to implement innovative models to create and deliver content to enhance student's learning. In the last eight years over 80 million smart class sessions have been held in schools. This has given Educomp some invaluable insights into the real challenges that teacher encounter and their ever-growing expectations from the program. These insights have helped to understand the pain areas to develop a whole new school transformation system. Educomp has now flagged off, the next generation of smart class. In smart class transformation system (CTS) and the smart class digital teaching system (DTS) are the biggest and most innovative initiatives in the space of digital classroom hardware respectively [\[5\]](#)

Temperature Controlled: According to the research finding students perform different at different temperature. This is observed that in a warm class room students' average score is less than a cool class room. So simple temperature sensors like LM35 can be placed in four corners of room to measure the average temperature of the room. Then the ventilation could be controlled according to the desired temperature.

### SMART DESK

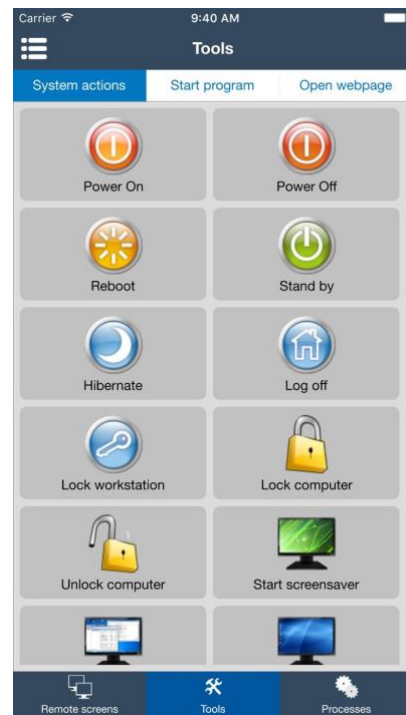
We can do analysis of student activities and student interaction with the learning material by using **Smart Desk** with IoT enabled devices. Smart desk is currently used in smart offices. They can also be used in schools and institutions to track a student's performance. A PIR sensor (SR501) can be installed on each desk and all desks can be connected to a single microprocessor. This would track the activity of the students and generate a report of each student. An average activity value could be calculated in the alpha testing of the product. Further the minimum and maximum activity values could be calculated. These values would notify the tutor or the professor that a particular student is not performing. Also, the activity values can be matched with the result of the student to check the self-study vs. class-study ratio.

### Example: Classroom Spy

This software lets you see what everyone's doing without leaving your desk. You can monitor the activity of all student computers in your classroom remotely. Plus, you can share your screen with your students' record activity, control computers, conduct demos, limit the internet usage, block applications and much more. Works on LAN, WLAN, VPN and Internet and can be configured and installed remotely. It is password protected and supports multiple monitors.

#### Features of Classroom Spy [6]

- Classroom monitoring to monitor the screens of the students in the class
- Casting your screen on the students monitor
- Access the controls of the student computer
- It locks the control of student's computer to get the attention
- Record classroom computers and store it in AVI format
- Send and collect files
- Used to power off, restart, hibernate and lock workstation
- Blocks unwanted websites on the student's computer
- Also used to start or stop a process on the student's computer
- Monitor thin clients, terminal services (RDP) sessions

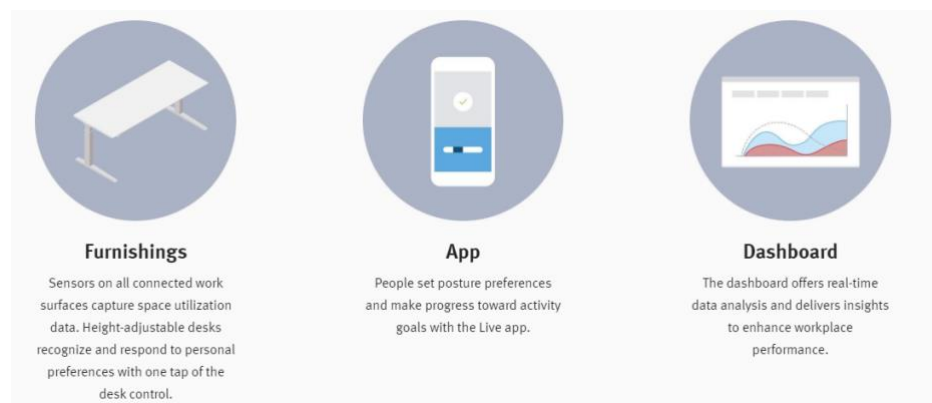


### Example: Smart Furniture

Global design manufacturer, Herman Miller, Inc. has built a software-based solution called **Live OS**, [7] which is a system of cloud-connected furnishings, applications, and dashboards, to include the iconic Aeron Chair brand - **Live Aeron**, the world's first connected chair. With this digitally enhanced chair, people are more aware of their seating posture and can set goals for improving it. Together, the Live app, desk, and

Aeron Chair create a new suite of responsive furnishings and tools that offer a more intuitive and active experience.

Basically, Live OS, a



software-based solution has been made by Herman Miller, a global design manufacturer it is a system of cloud-connected application that is connected to the dashboard and furniture, that is used for the Aeron Chair brand. With cloud connected chair, employees and students are more aware of their sitting posture. Together, the Live app, desk, and Aeron Chair create a new suite of responsive furnishings and tools that offer a more intuitive and active experience. It helps the user to adjust the desk according to his or her posture and also helps to increase the progressive nature of the user. This solution can also be implemented in educational settings, as students typically spend lot of time in school or colleges seating on the chair and with good posture and ergonomic habits their concentration on the studies could be enhanced.

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## SMART MONITORING & TRACKING

Traditional supervision or attendance system are cumbersome as it is practically not possible to detect the location of student in real time and attendance management tasks is very tedious, time consuming and error prone. As technology has advanced, integrating the student monitoring system with an automation technology can provide more convenient, secured and cost effective way to monitoring students and their activities. The Radio Frequency Identification (RFID) technology is one of the technology that is beneficial in improving traditional way of monitoring student for various activities including attendance.

RFID is one of the earliest and very widely used technology, which leverages electromagnetic field to store and retrieve data and hence automatically identify and track tags attached to any objects. There are two types of RFID tags – passive tags collect energy from a nearby RFID readers interrogating radio waves; and active tags have a local power source, typically through a battery, and can operate 100 m or more away from the RFID readers. Unlike barcode which need to be visible to the barcode reader, RFID tags need not be in the line of sight of the reader and can be embedded inside the object.

Every RFID tag has its own unique ID, it is easy to differentiate every tag holder. In addition, a Graphical User Interface (GUI) provides more efficient way to review the attendance. Thus, the integration of RFID technology and the GUI in an attendance system will produces an automatic system which give better performance and efficiency as compared to traditional methods. Furthermore, RFID technology can help to identify and also monitor not just students but also other critical and expensive assets of a school or college, wirelessly within a specified distance (*a few centimeters to hundreds of meters*). In this system, the RFID tags enable the school/university management people to supervise the student movement in and out of the campus. When the RFID tags pass through the RFID reader in a suitable range where reader can detect and read the tags , the system will record the data from the RFID tags to the database systems. [8]

Existing System	Proposed System
<ul style="list-style-type: none"> <li>• Old fashioned student attendance system was a tedious task to perform and maintain and also time consuming</li> <li>• Barcodes are less secure because can be easily reproduced.</li> <li>• Manual attendance system, is very time consuming and error prone such as proxy.</li> </ul>	<ul style="list-style-type: none"> <li>• This system uses individual RFID tags for each user identification.</li> <li>• This system uses RS 232 protocol for communication.</li> <li>• For the security purpose, we capture the image of the user</li> <li>• Dashboard to monitor the student movement within.</li> </ul>

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## SMART SPORTS

Sports and athletic training is becoming crucial day by day for India due to rising expectations of improving performance in national and international sports events for every Indian sports person. Even schools in modern India, provide physical education and trainings. For students who are either natural athletes or keen to participate in sports, modern smart technology can immensely help to improve their sports.

Schools can use devices to monitor the performance of the students in athletics such as smart bands can be provided to students with a RFID tag that can monitor the students fitness. Time table could be linked with the bands of the student to check the performance of the students during their game period. These data and information could be used by the sports teacher to be attentive towards the weak students.

Many organizations are utilizing IoT in specific areas of athletes or sports to address a particular need or challenge and are focusing their IoT efforts on few key areas:

- **Player Development:** IoT is revolutionizing the way coaches facilitate training, manage players, and address key situations in each game. Combining advanced analytics with sensors and game video, coaches can easily process vast amounts of data to obtain metrics on player efficiency, player performance, and opponent weaknesses to better develop in-game strategy.
- **Player Safety:** IoT is shaping the way that sports physicians, physical therapists, and team doctors are reducing injuries and helping players heal faster. Embedded devices such as smart insoles and built-in chips offer real-time tracking that provides a holistic view of the athlete, allowing organizations to make the best decision for their longevity and health.

- **Fan Experience:** IoT allows teams to customize the experience for each fan from the moment they consider purchasing tickets through to the final whistle, and beyond. With rising ticket prices and declining sales, teams should use IoT to create a unique and unforgettable experience for fans, both inside the stadium and at home.

Sports organizations stand to benefit immensely by executing a comprehensive IoT strategy and integrated framework as technologies scale and humans become more interconnected through different mediums of technology.

**Example:** IBM Watson – Sports Analytics.

IBM Watson is an IoT Platform built by IBM to cater to multiple IoT solutions and provide machine learning and advanced analytics support. IBM Cloud is part of IBM's IoT offering, which is easy-to-use, secure and scalable. Watson is designed to simplify cognitive IoT development so that enterprises can harness the full potential of the Internet of Things. IBM supports multiple use cases from Industrial to Consumer and as part of their offering they have devised a player's performance monitoring and enhancement solution.

Using sensors combined with advance analytics, coaches can identify events such as if a player took a wrong step, if a player needs to rest their ankle or if they suffered an injury in a collision. These technological advances are making sports safer for professional athletes and will



soon provide the same support to amateur athletes. Watson IoT in sports enhances performance on and off the playing field and builds competitive advantage with IoT data.

As per IBM [\[9\]](#), IBM Watson IoT is delving deeper and revolutionizing the way people interact with sports. Wearable devices, embedded sensors, and smart athletic gear are all pieces of the future of sports. Access to a wealth of information that is digestible, relevant, and real time will transform how athletes train and perform. Athletes, sports fans and venues alike are seeking the benefits of connected technologies and some of the features offered are:

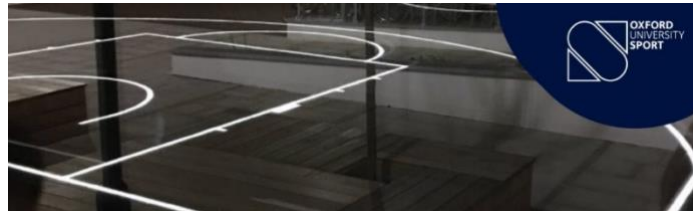
- Solution puts performance, biometrics and weather insights into athletes' and coaches' hand's in real time.
- Empower athletes with real time feedback using connected devices.

- Gain instant visibility into athletes' fitness training and performance.

#### Example: **Oxford University Smart Sports Flooring**

A new sports centre with a pioneering smart glass floor that lights up and changes its line markings at the touch of a button, has just been completed by Oxford-based construction firm Beard for the University of Oxford. It is the first smart floor in the country to have sports played on it.

The game-changing facility [10] is part of Oxford University's new multi-million-pound Acer Nethercott sports centre built by Beard as part of a major redesign of the University's sports facilities on the



historic track where Sir Roger Bannister broke the four-minute mile. Beard worked with hi-tech sports floor specialists ASB to deliver the 700 sqm futuristic multi-sport performance space which took six weeks to install and is made up of LED lights embedded in the glass floor. These illuminate the markings of the sports being played which include badminton, basketball, dodgeball, handball, football, futsal, korfbal, netball and volleyball. The lines are only switched on when they are needed, eliminating the confusing lines of traditional sports hall floor markings. The floor can also be customised and produced in any colour, integrating logos and school brand colours. Basically, this solution can enhance the utilization of space and make the marking very accurate as per the game or sports played on it.

#### SMART WEARABLE

Smart watches, smart fitness bands, and trackers probably started out as a fad but gradually the fitness trackers have become one of the integral parts of the athletes and fitness for students due to affordability, increase in features such as tracking steps, heart rate, BMI, sugar level, sleep patterns, etc. Wearable helps the consumer to track these important parameters and gain some insights on their health and wellbeing.



IDC Worldwide Quarterly Wearable Tracker [11], CY Q1 2017 saw total shipments of **612 K units** of wearables in India, which includes smart wearables, that can run third-party apps, and basic wearables which cannot run third-party apps. Various research house has projected multibillion-dollar wearable market with CCS Insights predicting it to be \$25 Billion market by 2019 [12]. Lenovo plans to manufacture wearable in India to focus on the Indian market wearable demand.

*“The company is targeting to corner by this year a 20% share of India’s market for wearables, such as smartwatches and fitness bands”* Head of accessories at Lenovo Mobile Business Group, Reuters

## CHALLENGES & RECOMMENDATIONS

A successful and effective adoption of IoT technology to build a scalable and cost-effective smart education solution to maximize the power and benefits of IoT, we need to overcome the challenges and below we cover some of the key challenges and provide our recommendations to overcome them.

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## INVESTMENT & ROI

In order to implement an effective strategy within the educational ecosystem, various stakeholders including management, staff, teachers and student bodies should focus on laying the foundation from a technology, organizational structure, culture, and process perspective on a holistic scale. We suggest that adopt smart solution as baby step with limited scope of implementation and improvising the solution as per the need. Unlike many other IoT use cases, the return on investment in smart education industry will take longer as the purpose of technology adoption here would be to enhance learning and the output of enhanced learning can only be seen either during placements or in the exam scores. However, both of these parameters might take more than two to three years to be evaluated properly, which could be demotivating for investments by the educational institutes alone.

Recommendation is for the **Government and Educational Standards** bodies to act proactively but making some of smart education as mandatory for adoption such as smart attendance, student monitoring and safety tracking, mix of online and offline education and incentive for building richer content that can be made available through electronic medium to tier II, III towns and rural areas. Government would need to support **research and adoption of smart technologies** both through allocation of technology adoption fund, guidelines, investment in ICT, connectivity in rural areas and tax breaks. As only when the primary education becomes ubiquitously available can India really progress as a nation, we urge the Government authorities to increase spending on educational research and smart education solutions with the focus on both classroom and physical education.

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## HORSES FOR COURSES

Smart Education solution explored and researched globally as part of this whitepaper signify that various countries are building solutions as per the need or the demand. For example, the smart sports floor in London makes sense as it results in saving space and improving efficiency of the game. Smart and connected chair is an amazing solution but not affordable and something of value for Indian education market as of now. Our recommendation here is that solution developers and service providers should focus on the basic need of education sector such as, need to make sure the education reaches every nook and corner of India, enhancing the safety of the students and staff, improving the efficiency of various learning modes of education, giving the right set of tools for tracking performance of the students specially for sportsperson. Market demand in India can be easily studied through various primary and secondary research and may differ state wise but our suggestion is to go for pan India demand as listed above and help to build a better nation.



With renewed focus on winning medals at national and international events in sports and athletics we strongly recommend to build solutions for the need of such sports, starting with wearable, trackers, connected instruments and then moving on to more advanced solutions such as connected stadium, smart pitches, robotics etc.

Likewise, in case of classroom-based education, right now as per the research key focus area are smart classroom, attendance and safety management, building and delivering richer content for primary education and mechanism to deliver it cheaply in rural areas.

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## COLLABORATION

India has multiple government bodies which cater the education sector. There are multiple government backed organizations such as MHRD (ministry of human resource development), non-profit organizations delivering education across India or creating standards such as NCERT, for profit organizations which are building and selling educational tools and content such as Udemy, BYJU's, a very highly fragmented training institutes across the nation, practitioners, professionals, MOOC operators and trainers. We have observed as part of the research that these multiple bodies, at least the organized and recognized one, interact with each other but on a limited basis. A higher and deeper collaboration is required for them to bring synergies across multiple groups and build a strategy and body for aggressive technology adoption in education system.

For example, private universities these days are promoting new age technologies and skills and also brining new formats and methods of learnings but there is no uniformity across the universities and no guidelines form the central authorities on measuring the effectiveness of such new age digital learning modes and fundamentals. Stronger collaboration to understand the requirement of the sector and also most efficient business model will also lead to engineering excellence and design for the creating the best solution.

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## About IET India

The IET is one of the world's largest engineering institutions with over 168,000 members in 150 countries. It is also the most multidisciplinary – to reflect the increasingly diverse nature of engineering in the 21st century.

The IET is working to engineer a better world by inspiring, informing and influencing our members, engineers and technicians, and all those who are touched by, or touch, the work of engineers. The IET office started operations in India in 2006, in Bangalore. Today, we have over 13,000 members and have the largest membership base for the IET outside of the UK. Our strategy is to deliver activities that have an impact on overall competency and skill levels within the Indian engineering community and to play an influencing role with industry in relation to technology innovation and solving problems of public importance.

We plan to achieve this through working in partnership with industry, academia and government, focussing on the application of practical skills within the learning & career lifecycles (particularly early career), and from driving innovation and thought leadership through high impact sector activities.

The technologies that we have chosen to focus on are:

a. The Internet of Things (IoT)

b. Future of Mobility and Transport

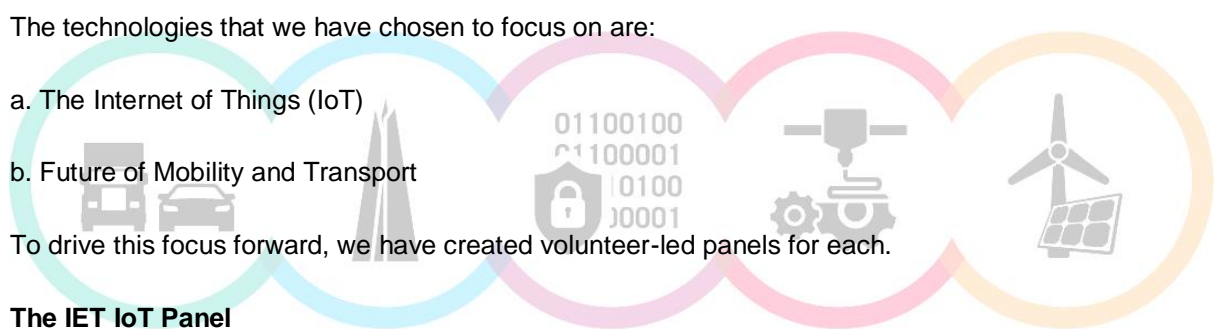
To drive this focus forward, we have created volunteer-led panels for each.

### The IET IoT Panel

One of the most important technologies that will connect all sectors will be Internet of Things (IoT). With 1.9bn devices expected to be connected in India alone, by 2023, IoT and related technologies assume relevance of significant proportions. Across sectors we will see energy, power grids, vehicles, homes, entire cities and manufacturing floors, computers and mobile devices being connected.

Leveraging its position as a multi-disciplinary organisation, IET India launched its IoT panel on February 20, 2015 with Dr Rishi Bhatnagar (President – Aeris Communication) as the Chairperson. The panel, being a first of its kind in India, focuses not only on technology but the application aspect of IoT in various segments.

The focus is to facilitate discussions that will help in making the inevitable connected world more efficient, smart, innovative and safe. It will focus on technology, security and regulatory concerns and the need for nurturing capabilities and talent for a quicker adoption of IoT in all spheres. The panel also constitutes sub panels / working groups focusing on the application of IoT in Agriculture, Retail, Energy and Healthcare domains. Each of these sub panels will work towards undertaking neutral pilots and studies and publishing white papers around the application of IoT in the respective domains.



The IET India IoT Panel will provide a platform for stakeholders to participate in becoming an authoritative, but neutral voice for the evolving movement of IoT in India. It aims to enable all the IoT practitioners (including people from the hardware – devices, portables, sensors, software, business) and IoT enablers ( including people from regulatory area, training area, investors in IoT, end users) to work together on relevant areas to make this industry efficient as well as robust. The panel envisions laying a solid foundation by supporting policy makers, industry in the next step of adoption of IoT.

The panel works through Working Groups - Healthcare, Social Impact, Telecom, Smart Living, Skills, Standards, Regulatory & Legal, Cyber Security, Ganga Rejuvenation and Energy.

Read more on <http://www.theiet.in/loTPanel>

**If you are interested in volunteering for the IET or joining one of our panels, please write to us at [india@theiet.in](mailto:india@theiet.in)**

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