# IoT Solutions Industry Prospects Analysiswith Specific Reference to Mobiloitte Inc.

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## ABSTRACT

Life is made easy by a rising technology, the Internet of Things, which promised transformation in the way we work, we live, we play, we analyze and we think. The influence of IoT is seen everywhere today, from consumer products to military equipment, from motorbikes to airplanes, from manufacturing units to industries, and from daily use items to utility components and from house to smart cities. The everyday use objects which are being combined with Internet connection and data analytics capabilities guarantee ease of doing work, ease of living, ease of analyzing, ease of thinking and ease of playing. In essence, IoT provides a flat-form to interconnect various electronic devices through the Internet and open up a new world of possibilities. Mobiloitte is a leading complete service solution development company for IoT, AI, and BOTS along with other related areas with time, security, scale and performance as its focus points. The company strives for 'Top Notch Quality Work' and 'Complete Customer Satisfaction' as its business ethics. E3 – Experience, Excellence, and Exuberance is the company's work motto for the 'Go-to-Market Strategy' of the company to provide unique services and solutions to its customers and by that keeping itself in advantage position in the field competition. The company is equally comfortable working with different types of setups like Start-Ups, Small & Medium Enterprises, Large Enterprises, Development Sector, Public-Private Partnerships, and Governments. Completion of more than 5000 projects in a decade is a testimony to that. In this paper, we attempted to analyze various IoT solutions the company provides, highlight their technical backgrounds and list out their applications. At present, the company is providing IoT solutions in a large spectrum covering areas like surveillance, power, video inspection, customer feedback, marketing, skill-building, security, etc. Besides, this article also deliberates business challenges and potential solutions to provide different IoT based solutions appropriate to customer requirements and lists out emerging IoT technologies with a futuristic outline.

**Keywords:** Mobiloitte, Internet of Things, Artificial Intelligence, 3E, Internet, Solutions.

## 1. INTRODUCTION :

In the world of information technology, the buzzword Internet of Things (IoT) is not recent. It's been in use for a while now. Off late, due to technological advances in wireless technology, the word is attracting more attention and attraction. IoT will expand the scope of the Internet from a mere link provider to various computers and computer equipment to allow the interconnection of different things, physical objects, we see around us and we are around such things as lamps, fans, air conditioners, toothbrush, microwave oven, pens, televisions, washing machines and so on in our

residence, internet-working of different machines or equipment in the business, and so on[1]. The IoT technology empowers these 'things' by talking to each other, sharing information, and synchronizing activities to see, hear, think, speak and perform jobs assigned to them. The very technology allowed them to turn themselves from passive to active and intelligent by supplying the technologies they needed, such as ubiquitous and omnipresent computing, embedded devices, communication systems, sensor networks, protocols and a variety of applications. Original IoT was strongly based on Radio Frequency Identification for Interconnection; today there are several technologies similar to Radio Frequency Identification, Near Field Communication, Machine-to-Machine and Vehicle-to-Vehicle Communication all may be made use off to implement modern IoT solutions. The IoT technology promised a revolution in the way we work, we live, we play, we analyze and we think makes life easy. IoT's influence is seen everywhere today, from consumer products to military equipment, from motorcycles to aircraft, from manufacturing units to industries, from everyday use items to utility components and from home to smart cities[2]. The everyday use objects which are being combined with Internet connection and data analytics capabilities guarantee ease of doing work, ease of living, ease of analyzing, ease of thinking and ease of playing. In essence, IoT provides a flat-form to interconnect various electronic devices through the Internet and open up a new world of possibilities. It was anticipated that every different thing we see around us and we have around us will all be internet-worked or interconnected very soon.

IoT Technology primarily benefits industry, governments, and consumers. Through their solutions and solutions, each group of its shareholders enjoys different types of benefits. Reducing operating costs, increasing efficiency, streamlining markets, delivering smart products/services, monitoring customer behavior, etc. are some of the benefits that IoT brings to the business. Expanding efficiency, lowering the cost of governance, providing the citizens with sophisticated living environments, securing information, accessibility of people, etc. are the list of benefits that IoT offers to governments. Consumers enjoy enhanced comfort, increased efficiency & experience, added safety & security, decision-making support, and remote control of objects [3].

In this paper, we made an attempt to analyze various IoT solutions Mobiloitte provides, highlight their technical backgrounds and list out their applications. At present, the company is providing IoT solutions in a large spectrum covering areas like surveillance, power, video inspection, customer feedback, marketing, skill-building, security, etc. Also, this article deliberates business challenges and possible solutions to provide different IoT based solutions appropriate to customer requirements and lists out emerging IoT technologies with a futuristic outline.

## 2. OBJECTIVES :

- To provide an overview of IoT Technology
- To understand IoT Application Development
- To know IoT solution development for end-users
- To familiarize IoT solutions development for Industry
- To comprehend enabling technologies for IoT
- To analyze the future scope

## 3. RELATED WORK :

IoT is one of the most suitable technologies for automating processes in any field. It can make any objects think, connect, interact and take decisions depending on the environment they are working on. Smart sensors and actuators supported by a wide pool of communication technologies powered Internet, IoT is capable of automating any solution. A good number of researchers have proposed viable solutions to various issues of our daily lives over the years. Some of them are being examined here to get a deeper insight into the subject.

**Table1:** IoT Solutions proposed by the researchers.

| SN | Author | Year | Solution Proposed | Technology Used |
|---|---|---|---|---|
| 1 | Langendoen *et al.*[4] | 2006 | LOFAR- Plant or crop monitoring System | WSN, Sensors |
| 2 | Xijun *et al.* [5] | 2009 | System for monitoring water level and rainfall in irrigation systems. | WSN, Sensors |
| 3 | Watthanawisuth *et al.*[6] | 2009 | A real-time air monitoring system of microclimate | WSN, ZigBee, SHT1 Sensors |
| 4 | Lu *et al.*[7] | 2010 | Environmental monitoring system | GPRS, Sensors |
| 5 | Ehsan *et al.*[8] | 2012 | Delay-tolerant WSN for the monitoring and tracking of animals | WSN, Sensors |
| 6 | Postolache *et al.*[9] | 2013 | Water quality assessment through the measurementof conductivity, temperature, and turbidity | WSN, Sensors |
| 7 | Ferre*et al.* [10] | 2013 | online microclimate monitoring and control system for greenhouses | WSN, Sensors |
| 8 | Minbo*et al.*[11] | 2013 | IoT-based agricultural production system for stabilizing supply and demand for agricultural products | WSN, Sensors, Predictive Analysis |
| 9 | Kyriazis *et al.*[12] | 2013 | Heat and electricity management & Eco-conscious cruise control for publictransportation | GPS, WiFi, M2M, |
| 10 | Chen *et al.*[13] | 2014 | Monitoring multi-layer soil temperature and moisture in a farmland fields | WSN, ZigBee, GPRS, Sensors |
| 11 | Fourati *et al.*[14] | 2014 | Web-based decision support system communicating with WSN for irrigation scheduling in fields | WSN, Sensors |
| 12 | Khriji*et al.*[15] | 2014 | Precision irrigation solution | WSN, TelosB motes |
| 13 | Zaidi *et al.*[16] | 2014 | IoT Empowered Smart Lighting | Ambiance and Proximity Sensors, PIR, Wifi, ZigBee, BLE |
| 14 | Skouby *et al.*[17] | 2014 | Smart Home and Smart City Solutions enabled by 5G, IoT, AAI and CoT Services | CoT, AI, M2M, 5G, BigData, |
| 15 | Shuwen and Changli[18] | 2015 | Farmland irrigation monitoring | ZigBee, Sensors |
| 16 | Roy *et al.*[19] | 2015 | An agricultural intrusion detection system | WSN, Sensors |
| 17 | Saville *et al.* [20] | 2015 | real-time estimation system for fixed-net fishery using ultrasonic sensors and supervised learning. | Ultrasonic Sensors, Supervised Learning |
| 18 | Murthy *et al.* [21] | 2015 | Presented the Lighting-Enabled Smart-City Applications and Ecosystems (LENSCAPEs) | WSN, OLN, Sensors |

| | | | | |
|---|---|---|---|---|
| | | | framework | |
| 19 | Gaur *et al.* [22] | 2016 | Smart City Architecture and its Applications | RDF, OWL, SPARQL, 3G, LTE, WiFi, WiMAX, ZigBee, CATV, Sensors |
| 20 | Aman *et al.*[23] | 2019 | Automatic Segregation & Efficient Solid Waste Management using IoT Solutions for Smart Cities | Ultrasonic Sensor, Water Sensor, Arduino UNO R3, WiFi, |
| 21 | Patade*et al.*[24] | 2019 | Smart Hospital | MQ-6 Gas Sensor, IR LED, Arduino UNO, Ethernet Shield, Node MCU, WiFi |
| 22 | Ventulett & Villegas[25] | 2019 | Protecting Assets, Protecting People - IoT Solutions to Drive Improved Asset Integrity and HSE Performance in Oil & Gas | Sensors, WiFi, LTE, NFC, Intrinsically Safe Tablet |

## 4. COMPANY BACKGROUND :

Mobiloitte is a leading complete service solution development company for IoT, AI, BOTS along with other related areas with time, security, scale and performance as its focus points. The company strives for 'Top Notch Quality Work' and 'Complete Customer Satisfaction' as its business ethics. E3 – Experience, Excellence, and Exuberance is the company's work motto for the 'Go-to-Market Strategy' of the company to provide unique services and solutions to its customers and by that keeping itself in advantage position in the field competition. The company is equally comfortable working with different types of setups like Start-Ups, Small & Medium Enterprises, Large Enterprises, Development Sector, Public-Private Partnerships, and Governments. Completion of more than 5000 projects in a decade is a testimony to that. Headquartered at New Delhi, the company has development centers at Bengaluru and Gurugram and Client Proximity Centers at Singapore, USA, UK, Canada and Norway [26].

## 5. ENABLING TECHNOLOGIES :

How will it happen? The different things, the seats, the tables, the lighting systems, the watches, or whatever, all we can think of, will be equipped with embedded systems. These embedded systems, together with embedded electronics, embedded processors, embedded communication systems, allow some basic computing platform to be attached to them and they will act as different nodes of that particular Internet, the internet of things. These devices are fitted with embedded systems that help them link different things around them and depending on the application requirements, depending on the specific objectives of the business and then a huge network will be created that is much larger than the current computer internet and that is the internet-work, internet of things, IoT[27], [28].
According to Mario Morales, IDC, by 2020, IoT will have 4 billion connected people, $4 trillion in revenue generation, over 25 million Applications, over 25 billion embedded and smart devices, and about 50 trillion Bigabits of Information. These figures show how quickly technology is growing [29].

## 6. ELEMENTS OF IoT ECOSYSTEM :

The IoT Ecosystem is a combination of different IoT layers from the application layer to the level of communication. IoT ecosystems of industrial quality consist of numerous architectural components such as components of hardware, software, and layers of networking of analytical devices, etc. The generic architecture of an IoT ecosystem is not easy to define in practice as it varies from business to

business. Here an attempt is made to generalize the IoT network components based on which an ecosystem is centered [30].

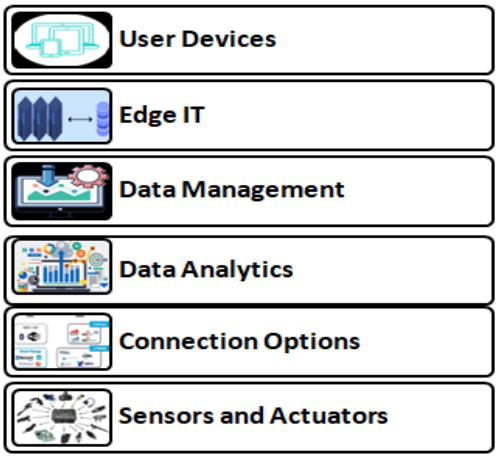


**Fig.1**: Elements of IoT Ecosystem.

**1. Sensors and Actuators:** To collect information based on a specific use case, users add temperature, gyroscope, pressure, light sensors, GPS, electrochemical, RFID, etc. For example, we use light sensors for automotive use, along with pressure, velocity and imaging sensors. A key step in a good use case is to choose the right sensing components [30].

**2. Connection Options:** Connectivity is an important part of the IoT process. We cannot execute a use case without seamless interaction between IoT devices, end-users, and analytics or components. The different connectivity layer modules are :

**Protocols**: IoT implementations can be Internet-based and intranet-based. TCP / IP derived architecture is generally followed for web applications. Devices are connected to intranet IoT using LAN, RF, Wi-Fi, Li-Fi, etc [30].

**Gateway**: The IoT gateway connects the Internet and IoT devices. Sensor devices use an IoT gateway to push data into the cloud. The gateway aggregates sensor data, converts sensor data between different sensor protocols, processes sensor data and then sends it to storage and analytics cloud servers and applications. IoT gateways abstract the communication medium conceptually and also provide a secure channel that is necessary for the transmission of this information [30]. It performs several critical functions such as synchronization of devices, translation of protocols, sorting and processing of information, protection, updating, and more. New generation IoT gateways can also run software code for processing incoming statistics and providing intelligence. The gateways are usually installed within the organization or entity and are situated at the edge boundary of systems such as computers, controls, sensors on one side and the internet on the other [31].

**3. Data Analytics:** The data is used to extract important business knowledge and drive business decisions in virtually every case of IoT use. The system uses machine learning / deep learning models based on these huge data to gain insights. To build machine-learning models, the raw analog signals are pre-processed and converted into a format. The system chooses a big data infrastructure, depending on the use case [30].

**4. Data Management:** Industry-grade IoT solutions require raw and processed data to be collected, handled and controlled on a large scale. Cloud-based systems are commonly used to meet the business needs-based purpose. Large-scale companies that can handle large-scale data (as large as petabytes per second) also set up their own data centers to accommodate this [30].

**5. Edge IT:** Edge is the consolidated architecture of raw-data pre-processing software and hardware gateways. Edge systems are used to gather raw data from sensors, RFID, electromechanical components and convert it before it is sent to cloud servers. These also come with local storage, which before the conversion is used as a buffer for the data pipeline [30].

**6. User Devices:** The end components of an IoT ecosystem are smart devices such as smart-phones, tablets, PDAs, etc. Via cloud applications, these devices are connected to the IoT software engine and

remote access is built on demand. In some instances, the computational engine is embedded into modules, utilities or acted as a parent ecosystem feature of third-party user interfaces [30].

## 7. IoT INFRASTRUCTURE :

Three parts of the IoT infrastructure can be realized: i) things-oriented (perception layer), ii) internet-oriented (network layer) and iii) semantic-oriented (application layer). We may describe the first layer as "hardware". This layer includes sensors, actuators, and embedded hardware communication systems. "Middleware", the second layer, consists of on-demand storage and cloud computing tools for data analytics. And the third layer is known as "Presentation", which offers tools for visualization and analysis that can be accessed widely for different applications on various platforms [32].
As shown in the figure below, the basic architecture of IoT in Education includes 3 layers – 'user applications', 'network' and 'perception layers'.
The application layer is known to be a user-to-network interface. The network layer links nodes to the gateway level. The gateway point is an intermediate node between layers of application and perception, charging the collection of sensed data from the nodes in the layer of perception, and then sending the sensory data to a private cloud system area. The layer of perception may include the physical devices or sensor nodes that can sense an event or action.

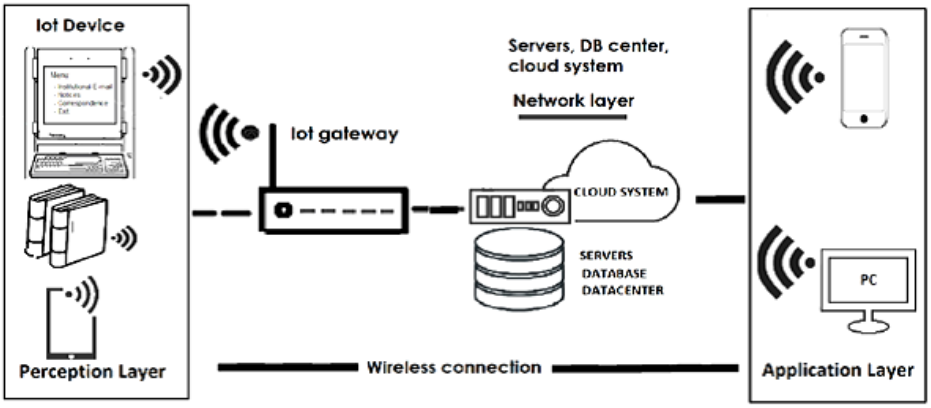


**Fig.2**: Architecture of IoT. Source: Internet of learning-things, 2013[4].

IoT sensors detect events or any information in the layer of perception in a typical IoT education system as shown in Figure-2. The information collected will be sent to the gateway stored for further analysis and user decision making in a private cloud that can be educators, learners or even developers [33].

## 8. IoT SOLUTIONS FOR END-USERS :

**Surveillance System:** Home Security became one of the need-of-the-time things in today's global village perspective world. The requirement of a technology that allows keeping an eye on the aged people, kids or pets at home remotely is felt by many. A low cost and handy solution that allows one to view surveillance videos from anywhere in the world with the help of mobile data or wi-fi connection, display alert or firing alarm as per the set rules, and store not viewed videos in cloud storage for the future view are their expectations[34]. Through Surveillance System Solution one can integrate several IP cameras and stream their data into a mobile app using different streaming protocols and compressions methods. This solution guarantees that the user will achieve peace of mind out of this.
**Smart Plug & Bulb:** Every Home Automation system begins with a Smart Plug. This Internet-enabled device can be used to control any electronic or electrical units of the home. By configuring the device to home wi-fi one can control it through the mobile app. The added feature of the device is that it is also used to monitor energy parameters, power consumption, line voltages, and power factors. This class of solution helps to design and develop such devices and integrate them with the

mobile app. This will help the user to operate home appliances such as ACs, Refrigerators, TVs, Microwave Owens, Fans, Lights, etc, monitor energy trends and power factors remotely.

**Customer Feedback**: In the success of any business the continuous feedback from the end-user plays a major role. Collecting feedback instantly, i.e. immediately after the service is provided or product delivery is more realistic and precise rather than doing so after a long gap. From this, the company can improve its service and products. Just-in-time feedback is more critical to service business compare to a product business. Service businesses like hotels, restaurants, hospitals, home-stays, clinics, salons, spa, etc., rely much on customer satisfaction. The company has a tested IoT based solution for this. The low-cost touch-enabled device and associated services customized for the business-specific requirements can be bought by the business provider monthly to collect on-spot, just-in-time, instant feedback. The device is compatible to connect to 3G/4G networks or wi-fi. Summary of feedback can be viewed either on mobile or on the web portal. Moreover, one can avail additionally clubbed services like a weekly report, email notification, inventory management, and consolidated data for chain stores from it.

**Video Inspection**: Industry 4.0 or a connected factory or smart factory is well being adopted by manufacturing units to enhance production. It is adding a special value to the industry by integrating operation technology with information technology and by that gain competitive advantage. Manufacturing units now focused to track the use of their products by the end customer directly and analyze the records to improve quality for products to be produced or being produced. To serve the purpose, the complete value chain strategy from suppliers to end-customer to be connected. – supplier->manufacturer->logistics->warehouse->retailer->customer. Best quality of images or videos of products captured from different stages of production is fed into the 'learning service', that in turn develops an analytical model to discern 'OK vs NOT OK' features of units that either met with the quality specification or not[35].

**Real-Time Asset Management (RTAM):**Whether it is retail, manufacturing, distribution or shipping for any type of business, the planning, and management of inbound raw materials and outbound finished goods is a challenge to monitor through conventional supply chain systems. Materials are often inappropriately trafficked or deposited, which in turn impacts items. Use of Real-Time Location Systems (RTLS) addresses this issue and improves supply chain management logistics. The solution is given by using two prevalent Bluetooth Low Energy (BLE) technology iBeacon and Radio Frequency Identification (RFID). With Beacon Tags and Beacon Gateways, Mobiloitte offers this solution class. Nevertheless, consumers are equipped with a Mobile and Web Interface that allows easy monitoring of resources. For connectivity, the company uses WiFi or a 3G/4G network. It provides various classes of RTAM solutions based on customer infrastructure, expected level of accuracy, a security requirement, and intended type of ownership [36].

**BP Marketing:** Beacon is a lightweight, tiny radio transmitter based on Bluetooth. The beacon-enabled system transmits a signal that can be seen when any Bluetooth embedded device such as smartphones appears in the scope. The technology empowers retail sellers to research, grasp and evaluates customer buying trends. In this perspective, by integrating online and in-store shopping information, customer loyalty solutions by allowing smartphone-based loyalty programs, Mobiloitte focuses on the enhanced customer shopping experience, customized deals based on personal buying patterns and navigation for customers to help monitor retailers[37].

**Asset Management & Tracking:** Real-Time Location System (RTLS) helps the supply chain management system to schedule and control the movement of raw materials and finished goods. This will reduce waste and improve logistics. All this is possible with the use of two core technologies, iBeacon allowed by Bluetooth Low Energy (BLE) and Radio Frequency Identification (RFID) tags. The company uses Beacon Tags and Beacon Gateway to manage Real-Time Asset Management. Such customers can use mobile apps and web portals to track property.

**Smart Office:**A smart office environment creates an atmosphere for employees to work better, easier, more effectively and diligently. By using different sensors and tailored software, an office can be made intelligent so that the human resources available can be used for increasing business and marketing capabilities management. Smart Office Environment can boost productivity, reduce

maintenance costs, streamline business operations and save resources. Mobiloitte has a solution that can be personalized by ensuring efficient office management and increased productivity to the working environment of any form of workplace.

**Door Lock and Camera System**: Security is becoming one of the prime components of any kind of setup, whether it is for families, homes, individual shops, offices, businesses or departments. Using a smart lock, doors can be opened or closed remotely via a mobile app or at the doorstep, as well as video streaming of the activities at the doorstep. Mobiloitte has built-in firmware and app smart lock solution that uses home WiFi connectivity.

**Lighting System**: A smart lighting system includes features that collect energy-related data such as power consumption, power factor, and voltage. The application or web portal allows users to view trend data that can be used for decision making. Mobiloitte helps develop these solutions using smart lights and interfaces preferred by customers. Through this application, one can switch on or off lights, track interval energy consumption, set lighting rules, change the color and intensity of lights, etc., all remotely using either a mobile app or a web portal.

**Security Alarm**: Home, office and company set-up safety and protection is a concern for its owners. A solution integrated with a fire or smoke detector, a toxic fume sensor, a PIR motion sensor, etc. controlled by a microcontroller, will raise and alert the user to situations such as fire by sending an alert message to the mobile device or triggering an embedded buzzer.

**Smart Shower:** Bluetooth enabled showerhead, which can be conveniently controlled with a mobile app, makes showering much easier and more enjoyable. This allows users to stream their favorite music, listen to news or radio, and help minimize water use. Mobiloitte has a solution that allows the showerhead to pair a portable speaker wirelessly with devices to deliver high-quality audio at the time of the shower.

**Kitchen Care:** Mobiloitte has a flexible kitchen care system that combines Bluetooth or Wi-Fi enabled appliances with mobile apps for tracking and managing them. One can also use the device to order food, monitor the trash bin, read the barcode data attached to the packaged item and manage the inventory of the kitchen.

**Garage Control**: A microprocessor-controlled smart device can be used to test if garage doors are open or closed, as well as to control the motor to remotely close or open the door whenever appropriate. The company helps its customers build firmware systems and mobile app so that users can remotely monitor garage doors and receive correct warning messages [38].

**Temperature Control**: Many situations require indoor temperature control. It is critical because it offers thermal comfort and a reasonable quality of air. Using smart sensors, the temperature control unit demonstrates the ability to monitor heating conditions and manage heating and cooling systems accordingly. There are also options for creating multiple temperature schedules and managing multiple thermostats.

**Voice Service Integration:** Mobiloitte uses Amazon Alexa as a tool to integrate voice-controlled devices. The company is working on developing voice applications, Chatbots, and SMS bots.

**IFTT Integration:** IFTTT (If This Then That) will make apps and devices work in tandem. With this, a simple script can be created so that action can quickly cause the same action in another device or app. The company is helping to develop and implement the best efficient IFTTT applications that combine apps and devices.

**Smart Garden:** With a smart sprinkler, watering can be coordinated from anywhere via the mobile app. The smart garden center is capable of detecting tube leaks and breaks and collaborating with apps for home automation. It uses garden sensors only when necessary to measure weather forecast and water. It also sends alerts and notes on water saving. Watering can be scheduled through the phone [39].

## 9. IoT SOLUTIONS FOR INDUSTRIES :

Mobiloitte is also developing a variety of business solutions. The company provides a package of solutions for the telecommunications industry, including energy management, gas, access, alarm, employees, generator, asset tracking, preventive maintenance, monitoring setting, etc[40]. The smart

manufacturing approach solves many problems such as production control, resource digitization, capacity utilization, system uptime and downtime tracking, employee management, etc. Education solution tackles problems such as high fees, low student-teacher ratio, sufficient educational material, ward safety, and security, learning focused on students and community-based, etc[41]. The solutions include adaptation to new technology, multimedia-based learning, enhanced reality-based education, speech-text translation, student tracking, learning content digitization, etc. Smart Hospitality solution involves numerous issues such as predictive analysis, helpdesk focused on BOTS, power tracking, footfall analysis, etc. Smart construction approach combines problems such as smart customer interface, proximity-based advertising, automation, maintenance and management of resources, smart payments, waste management, security systems, etc[42], [43].

## 10. PORTFOLIOS :

**Smaartly -** Track the location of the car anytime, check and tag trips, a reminder for fuel and oil additives, avoid bad, expensive surprises. Connected Car is a smart plug-and-play app that connects user's cars to the Internet to deliver real-time location, travel history, maintenance alerts, engine diagnostics and driving insights to user's smartphones instantly.
**LOC84** - Is an OBD scanner link app designed to help simplify your auto life with the venue, diagnostics, data driving, warnings, boundaries and more.
**Swoope -** It's a clever way to get local bars, restaurants, and takeaways to order and pay. Connect mobile wallet directly back to the counter, order for collection, skip the queues in busy bars or start a tab with friends at the end of the night and easily split the bill.
**Zipato -** enables remote control of light, safety system, heating, cooling, shading or irrigation, track energy consumption and save power. And helps protect your home against theft, explosion, flooding, etc[44].

## 11. SUGGESTIONS AND RECOMMENDATIONS :

There is tremendous scope for IoT. IoT with newer technologies such as BlockChain, BigData, and Artificial Intelligence proves to be the show makers of the future. These technologies help the business to improve the efficiency of processes and provide a niche platform to streamline and strategize action plan. That is what one can read from the quotation of Bill Gates "*If you invent a breakthrough in Artificial Intelligence, so machines can learn, that is worth 10 Microsofts"*[45]. The major thrust areas are :

- Secured Transaction using Blockchain– "*Blockchain is a technology using which an individual or a company can make instant transactions on a network without the need of any middlemen*" [45]. Fool-proof, secured transactions are performed using Blockchain. It guarantees that the transaction records are tamper-free.
- Smart Energy & Resource Management - A good amount of energy can be saved if it is used appropriately. That is possible by monitoring energy consumption is monitoring by its controlling resources. That will make life more comfortable and easier[45].
- Internet of Medical Things – Well designed healthcare tools with IoT make it easier to monitor the patients' health status. Mobile health applications and virtual assistants to monitor the patient's health at home and a series of other intelligent connected devices will help in reshaping the medical world.
- Smart Driverless Vehicles – High-speed 5G network will create a paradigm shift in the auto industry from driver to driverless vehicles. Vehicles loaded with intelligent sensors supported by corollary technologies ensuring all these possible in the recent future[46].
- Asset Tracking – That is through monitor individual's assets in real-time, keeping track of inventories and customization of processes & workflows.
- Smart Cold Chain - This would increase the quality and effectiveness of food, pharmaceutical, and other perishable supply chains over long distances. This supply chain, known as the "cold chain" or temperature-controlled supply chain, is now gradually integrating digital technological systems, stable cloud infrastructure, and open architecture rather than pure freezers and freight trains [47].

- Smart Classroom–It is a setup made up of various types of tools both software and hardware. Types of modules that track different parameters of the physical environment or characteristics of students such as focus, attention, and performance are video projectors, cameras, sensors and face recognition algorithms [48].
- Predictive Health Analytics – It is the method of learning from past data to make future predictions. It would allow for the best choices to be made about health care, enabling treatment to be tailored to each patient [49].
- Cognitive computing - means giving computer systems the power of solving complex problems on their own. As with people, cognitive systems benefit greatly from experience, i.e. discovering excellent ways to understand issues. Cognitive computing sees an opportunity to extend its knowledge when a traditional machine considers a particular task impracticable [50].

## 12. SWOT ANALYSIS :

**Strength**

- Wide range of solutions to offer
- Use of widely varying technologies
- Expertise in new technologies
- International presence
- Adaptability to emerging trends
- Effective customer retention policies and employee management strategies

**Weakness**

- A fewer number of development centers and customer proximity centers
- Insufficient Management of Human Resources
- Less portfolio count
- Data protection Issues

**Opportunities**

- Offer business approaches to emerging ICT trends
- Inculcate new technologies in designing solutions
- Expand operational areas and fields
- Provide IoT solutions at the end-user level
- Incorporate more protection and data integrity to solutions

**Threats**

- Wide range of market competitors
- Continuously changing technology
- Vulnerability and Challenges to Security
- Changing IT policies at domestically and internationally

## 13. CONCLUSION :

Life is made easy by the IoT, which promised transformation in the way we work, we live, we play, we analyze and we think. The influence of IoT is seen everywhere today, from consumer products to military equipment, from motorbikes to airplanes, from manufacturing units to industries, and from daily use items to utility components and from house to smart cities. The everyday use objects which are being combined with Internet connection and data analytics capabilities guarantee ease of doing work, ease of living, ease of analyzing, ease of thinking and ease of playing. In essence, IoT provides a flat-form to interconnect various electronic devices through the Internet and open up a new world of possibilities. A few of them have already been explored and there is a great amount of it is waiting in. By linking smart physical objects together and allowing different applications to help smart decision-making, IoT is expected to be one of the main hubs between different technologies in the years to come. Opportunities are in abundance to Explore, Experiment, and Expedite IoT.

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