

# Internet of Things: Insights of Applications in Research and Innovation to Integrated Ecosystem

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## ABSTRACT

In existing world IOT find a great attention from researchers, it becomes an vital technology that offers a well-defined communications between objects and machines. That will offer immediate access to information about the real world and objects in it-leading to innovative facilities and increase in effectiveness and output. The IoT developments address the whole IoT spectrum form the devices at the edge to cloud and data centres on the backend and everything in between through ecosystems are generated by industry, research and application stakeholders that enable real-world use cases to quicken the in IoT and establish open interoperability standards and common architectures for IoT solutions. This paper studies the perception of many IoT applications and innovation of original connected technologies to the challenges that in front of the execution of the IoT.

**KEYWORDS:** Internet of things (IoT), Innovation, Research, Technology

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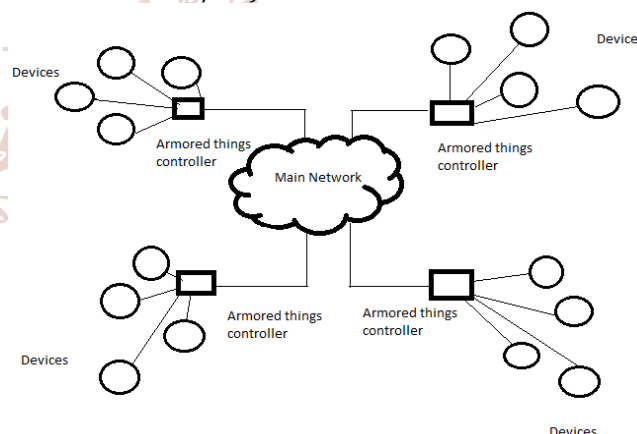
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## I. INTRODUCTION

The Internet of Things (IoT) is the network of physical objects moulded with electronics, software, sensors and connectivity to allow it to achieve greater value and service by swapping data with the manufacturer, operator or extra connected devices. Each object is uniquely recognizable through its embedded computing system but is able to interoperate within the existing Internet infrastructure. The IoT has the effect on education, business, communication, science and technology, humanity, government, etc. Clearly, the Internet is one of the most important part and powerful creations in all of human history and with the concept of the internet of things. The internet becomes more favourable to have a smart life in everyone elevation. Internet of Things is a new technology of the Internet access. By the internet on the Internet of Things, objects recognize themselves and obtain intelligence behavior by making or enabling related decisions thanks to the fact that they can communicate information about themselves. These objects can access information that has been aggregated by other things, or they can add to other services. Figure 1 shows that with the internet of things, anything's we will able to communicate to the internet at any time from any place to provide any services by any network to anyone. According to Literature survey the current research of IoT, key enabling technologies, major IoT applications in industries, and identifies research trends and challenges. A main contribution of this review paper is that it summarizes the current state-of-the-art IoT in industries systematically<sup>1</sup>

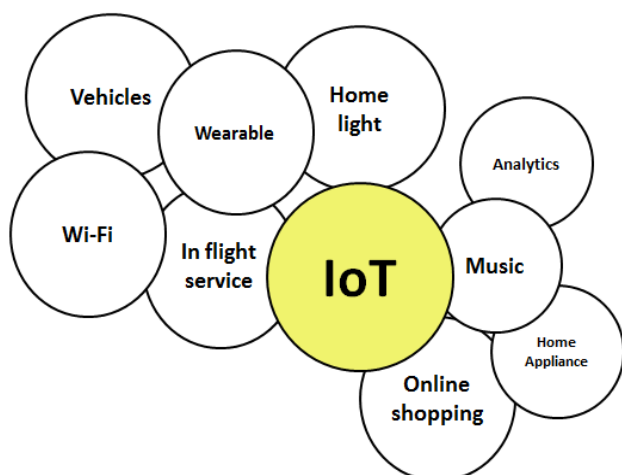


**Fig. 1 Internet of Things network**

The current works on occupancy monitoring and multi-modal data fusion techniques for smart commercial buildings. The goal is to lay down an agenda for future research to exploit the spatio-temporal data found from one or more of various IoT devices such as temperature sensors, surveillance cameras, and RFID tags that may be already in procedure in the buildings.<sup>3</sup>

Another research focuses specifically to an urban IoT system that, while still being quite a wide-ranging category, is characterized by their application domain. Urban IoTs, in fact, are considered to provide the Smart City vision. This aims at exploiting the most advanced communication

technologies to support added-value services for the administration of the city and for the citizens. This research henceforward provides a comprehensive survey of the permitting technologies, protocols, and architecture for an urban IoT.<sup>4</sup> one more research offers an overview of the Internet of Things (IoT) with emphasis on enabling technologies, protocols, and application issues.



**Fig. 2 Applications of IoT**

The basic idea is to have smart sensors collaborate directly without human participation to deliver a new generation of applications. The current mutiny in Internet, mobile, and machine-to-machine technologies can be realized as the first phase of the IoT. In the future, the IoT is estimated to bridge diverse technologies to allow new applications by relating physical objects together in support of intelligent decision making. This research provides a horizontal outline of the IoT. Then give an outline of some technical details that concern to the IoT enabling technologies, protocols, and applications. Compared to other survey papers in the field, our objective is to provide a more thorough instant of the most relevant protocols and application issues.<sup>6,7</sup>

## II. APPLICATIONS OF IOT

### 1. Smart home

Smart Home is the best feature in the technology of Internet of Things application on all measured channels. It also referred as home automation. Such system totally depends upon collection of data resources. New companies are active in smart home technologies there are so many other application in the field of IoT. That is a smart home powered by IoT. Instead of manually going up to the device and taking action. This list includes prominent startup names such as Nest or AlertMe as well as a number of multinational corporations like Philips, Haier, or Belkin.<sup>8</sup>

### 2. Wearables

A wearable device is a hot topic. Some extra capabilities of wearable devices are more mundane, but might also provide information that could be valuable in changing environmental controls. Wearable devices could tell that you have your jacket on in the car or if it's just in the back seat (perhaps by placing a few stress measurement device threads within the fabric of the jacket). This could be helpful in keeping the car temperature at a comfortable level. If your wristband can measure perspiration levels that could also be used as a data point for adjusting both temperature and humidity. IoT industry stands at more than half a billion dollars<sup>9</sup>

### 3. Smart City

Smart city extents a wide variation of use cases, from traffic supervision to water supply, to waste controlling, urban security and environmental checking. Its popularity is fuelled by the actual fact that a lot of Smart City solutions promise to alleviate real pains of people living in cities these days. IoT solutions within the area of Smart City solve traffic congestion problems, reduce noise and pollution and help make cities safer.

### 4. Smart grids

Future smart grid abilities to use information about the activities of electricity providers and consumers in a computerized fashion to improve the efficiency, reliability, and economics of electricity. 41,000 monthly Google searches focus the concept's popularity. However, the lack of tweets (Just 100 per month) shows that people don't have much to say about it.<sup>10</sup>

### 5. Industrial Internet

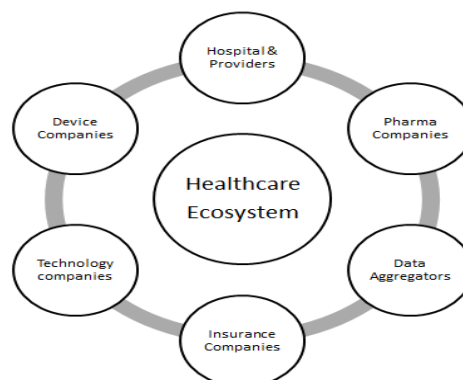
The industrial internet is also one among the special Internet of Things applications. While several market researches like Gartner or Cisco see the commercial internet as the IoT idea with the highest overall potential, its popularity currently doesn't reach the masses like smart home. The industrial internet however features a lot going for it. The industrial internet gets the biggest push of people on Twitter (~1,700 tweets per month) compared to other non-consumer-oriented IoT concepts.

### 6. Connected Car

The connected car is coming up slowly. Owing to the point that the event cycles in the automotive industry typically take 2-4 years, as we haven't seen much tinkle around the connected car yet. But it seems we are getting there. Most large auto makers as well as some brave startups are functioning on connected car solutions. And if the BMWs and Fords of this world don't present the next generation internet connected car soon, other well-known giants will: Google, Microsoft, and Apple have all announced connected car platforms.<sup>12</sup>

### 7. ConnectedHealth (Digitalhealth/Telehealth /Telemedicine)

Health is important part of a human life and also in Internet of Things applications. The concept of a connected health care system and smart medical devices stands enormous potential (see our analysis of market segments), not just for companies also for the well-being of people in general. Yet, Connected Health has not touched the masses yet. Prominent use cases and large-scale startup successes are still to be seen.



**Fig. 3 Healthcare Ecosystem**

## 8. Smart retail

**Smart retail technology** has many inventions developed with the Internet of Things technology. With these innovations, many businesses have been restructured. When the work is done in many business areas is connected in a connected way, labour and error rate drops. This decreasing labour force and error rate enabled the Internet of Things technology to work in this field as well. In the **smart car retail** industry also widely used Internet of Things technology. Internet of Things technology develops results for businesses and organizations in many areas. These solutions have reduced error rates in many business areas. Many organizations have decided to opt for solutions developed by the Internet of Things technology. The results of **smart retail analytics** have provided many innovations for businesses.

## 9. Smart supply chain

Supply chains have been getting smarter for some years already. Solutions for tracing goods while they are on the road, or getting suppliers to exchange in the inventory information have been on the market for so many years. So while it is perfectly logic that the research will get a new ambition with the Internet of Things, it seems that so far its popularity remains limited.<sup>14</sup>

## 10. Smart farming

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## 11. IoT in agriculture

As increasing in population demand for food supply is tremendously raised. Governments are helping farmers to use advanced techniques and research to growth food production. Smart farming is one of the fastest increasing fields in IoT. Farmers are using expressive insights from the data to yield more return on investment. Sensing for soil moisture and nutrients, supervisory water usage for plant growth and determining custom fertilizer are simple usages of IoT.<sup>16</sup>

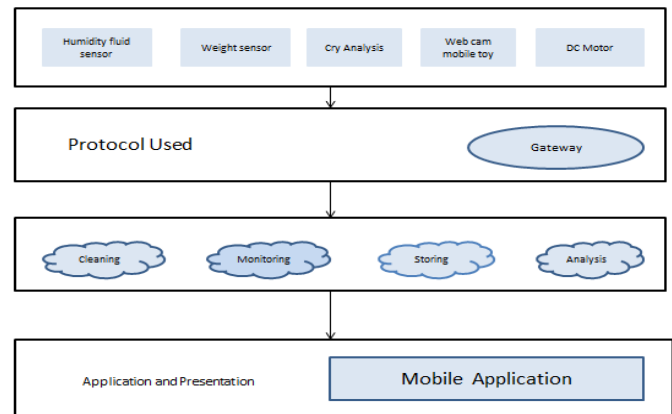
## 12. IoT Based Smart Water Irrigation System

Agriculture plays a vital role in a country's economy. It is difficult for the farmer to monitor the moisture level of the whole field and supply water. IoT project like smart water irrigation system proposes here an automated water irrigation system that can analyse the moisture of soil and climate condition. Users will be able to check the moisture level, and with the predefined threshold for a moisture level of soil, the power supply will be cut-off. In this way it will become easy for a farmer to Know about his field and with long distancing it can be take care.

## 13. IoT Based Baby Monitoring System

The idea is of the smart cradle system that will help parents to screen their baby child from a remote place. This idea comes up with a cry detecting appliance, Live video surveillance, cloud computing data, and user interface as mobile or web version. Diverse sensors attached to a cradle will check the humidity or hotness of the bed. A surveillance

camera on cradle will send footage of the main IoT program. All the data will be stored in the cloud. According to data, a health algorithm will check the state of that infant and alarm parents if any uninvited situation appeared. It will sense and alert the user according to situation.



**Fig. 4** Baby Monitoring System

## III. CONCLUSIONS

Internet of things is a advance technology which provides so many applications to attach the things to things and human to things over the internet. Each objects in the world can be identified, linked to each other through internet taking decisions autonomously. All networks and technologies of communication are used in building the concept of the IoT such technologies are mobile computing, RFID, wireless sensors networks, and embedded systems, in addition to many algorithms and procedures to get management processes, storing data, and security issues. IoT requires uniform method for architectures, identification schemes, protocols and rates will happen parallels, each one targeted for a particular and specific use. by the internet of things many smart applications becomes real in our life , which allow us to reach and contact with every things in addition to facilities many important aspects for human life such as smart healthcare, smart homes, smart energy , smart cities and smart situations.

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