

# **Internet of Things (IoT): Research Challenges and Future Applications**

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# INTRODUCTION

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- The Internet of Things (IoT) gradually evolving as the subsequent phase of the evolution of the Internet, it becomes crucial to recognize the various potential domains for application of IoT, and the research challenges that are associated with these applications.
- Ranging from smart cities, to health care, smart agriculture, logistics and retail, to even smart living and smart environments IoT is expected to infiltrate into virtually all aspects of daily life.



# POTENTIAL APPLICATION DOMAINS OF IOT

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1. Smart Cities.
2. Healthcare
3. Smart Agriculture and Water Management
4. Retail and Logistics
5. Smart Living
6. Smart Environment

# Smart Cities

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1. IoT plays a crucial role in improving the smartness of cities and enhancing general infrastructure.
2. IoT application areas in creating smart cities include; intelligent transportation systems, smart building, traffic congestion waste management, smart lighting, smart parking, and urban maps.
3. Application of IoT to achieve smart cities would require using radio frequency identification and sensors. Some of the already developed applications in this area are the Aware home and the Smart Santander functionalities.

# Healthcare

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1. A lot of benefits that IoT application offers in the healthcare sector is most categorized into tracking of patients, staff, and objects, identifying, as well as authenticating, individuals, and the automatic gathering of data and sensing.
2. Application domains in this sector include; being able to monitor a patient's compliance with prescriptions, telemedicine solutions, and alerts for patients' well-being.



# Smart Agriculture and Water Management

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1. The IoT has the capacity to strengthen and enhance the agriculture sector through examining soil moisture and in the case of vineyards, monitoring the trunk diameter.
2. The role of IoT includes studying water suitability in seas and rivers for both drinking and agriculture use, detecting pressure variations in pipes, and liquid presence outside tanks as well as monitoring levels of water variation in dams, rivers and reservoirs

# Retail and Logistics

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1. Executing the IoT in Supply Chain or retail Management has many benefits.
2. Include observing storage conditions throughout the supply chain, product tracking to enable trace ability purposes, payment processing depending on the location or activity period in public transport, theme parks, gyms, and others.
3. In the industry domain, IoT helps in detecting levels of gas and leakages within the industry and its environs, keeping track of toxic gases as well as the oxygen levels within the confines of chemical plants to ensure the safety of goods and workers and observing levels of oil, gases and water in cisterns and storage tanks.



# Smart Living

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1. In this domain, IoT can be applied in remote control devices whereby one can remotely switch appliances on and off hence preventing accidents as well as saving energy.
2. In addition, a wide range of kitchen devices can be interfaced through a smartphone, hence making it possible to adjust temperature, like in the case of an oven.
3. In terms of safety in the home, IoT can be applied through alarm systems and cameras can be installed to monitor and detect window or door openings hence preventing intruders.



# Smart Environment

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1. Smart environment strategies integration with IoT technology should be created for sensing, tracking and assessment of objects of the environment that offer potential benefits in achieving a sustainable life and a green world.
2. In weather forecasting, IoT can be used to deliver a significant accuracy and high resolution for monitoring the weather by information sharing and data exchange.
3. In waste management, which consists of various types of waste, like chemicals and pollutants being detrimental to the environment and to people, animals, and plants as well, IoT can also be applied.

# RESEARCH CHALLENGES

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1. Privacy and Security
2. Processing, Analysis and Management of Data
3. Monitoring and Sensing
4. M2M (Machine to Machine) Communication and Communication Protocols
5. Interoperability



# CONCLUSION

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- The future IoT will also generate tremendous amounts of new sensor data and information. Markets for software for data management, data formatting, data storage, and secure data transfer will boom as the size of the IoT grows.
- Methods for ensuring data privacy will be demanded by the consumer, but methods for data mining will also generate an increased software demand as corporations realize the potential for profit optimization from the new IoT information.

# REFERENCES

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