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STUDY on INTERNET of THINGS BASED APPLICATION

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Abstract: Since the term first coined in 1999 by Kevin Ashton, the web of Things (IoT) has gained significant momentum as a technology to attach physical objects to the web and to facilitate machine-to-human and machine-to-machine communications. Over the past 20 years, IoT has been a lively area of research and development endeavors by many technical and commercial communities. Yet, IoT technology remains not mature and plenty of issues must be addressed. during this paper, we identify 5 key research topics and discuss the research problems and opportunities within these topics.

Keywords: Internet of Things (IOT), Energy Harvesting, Data-Driven IOT, Hydra project4

I. INTRODUCTION

The vision of a connected and smart world is traced back to 1920s, as explained by artificer in 1926: "When wireless is perfectly applied the whole earth are converted into an unlimited brain, which after all it's, all things being particles of a real and rhythmic whole. However, the term "Internet of Things" (IoT) was only first coined in 1999 by MIT's Kevin Ashton when he promoted the frequency identification (RFID) technology. Since then, IoT has received significant momentum as a promising technology to indicate each entity (i.e., a thing) into a node on the online and to facilitate machine-to-human and machine-to machine communication with the physical world. By connecting and integrating both digital and physical entities, IoT enables a full new class of exciting applications and services like smart cities, smart homes, Industry 4.0, and Society 5.01. Over the past twenty years, particularly the last 10 years, IoT has been a thriving area of research and development efforts, with a quickly rising body of produced research work. per Microsoft Academic2, there are only 26 publications on IoT in 2000 and 160 publications in 2009.

II. APPLICATION BASED ON INTERNET OF THINGS

There are numerous and diverse potential application of the internet of things, since they wave their way into virtually every aspect of our daily lives as individuals, institutions, and society.

A. *Energy Harvesting*: -

The rapid evolution within the promising paradigm of IoT has resulted in a very massive distributed network of intelligent objects possessing a highly varying compute, storage, and networking capabilities. These networked objects interact with each other primarily in an exceedingly bid to exchange a various range of data having an immediate influence for enhancing the standard of our daily lives by ensuring seamless access to smart services anywhere at any time. However, variety of IoT sensors and embedded IoT devices have a limited lifespan since they're powered by batteries and, therefore, requires replacement periodically making this an inefficient, laborious, and dear process. A number of the energy sources that might be harvested for IoT include, but aren't limited to, thermal energy, light energy, RF energy, electromagnetic energy, energy, and energy. However, several underlying challenges still hinder the belief of an efficient IoT harvesting system. for example, the harvesting circuitry incorporates a considerable impact on the hardware of an IoT object since the standard IoT objects' designs are unable to handle the heavy fluctuations in an object's circuitry, primarily attributable to the actual fact that the harvested energy delivered to an IoT object is predominantly reliant on the provision of energy within the environment and which occasionally may be either inferior or perhaps superior to the facility requirements of an object's circuitry. Similarly, intelligent software for IoT harvesting systems should be designed by the software

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developers which are capable of handling the energy's unavailability for a shorter duration of your time to permit any task to resume and not restart from where it had been left, thereby mitigating the information loss.

B. *Data-Driven IOT*: -

IoT offers the aptitude to attach and integrate both digital and physical entities. A fundamental challenge centers around managing IoT data especially when things are the bulk of knowledge producers and consumers. Given the intrinsic features of IoT data, topics like storage, real-time data stream analytic, and event processing are all critical. Before diving into these four topics, we'd first summarize these features. Data generation in IoT has four main characteristics: i) Velocity—things produce data in several speed levels and a few sensors can scan at a rate up to 1,000,000 sensing elements per second1 ; ii) Scalability—IoT data are expected to be at a very large scale thanks to the flexibility of IoT sensors to continuously generate data along with the foreseeable excessively sizable amount of things; iii) Dynamics—mobility is one characteristic of IoT things, resulting in data generated in numerous locations under different environments at different times; and iv) Heterogeneity—many styles of things are and will be connected to the net and also the data generated may be in numerous formats using different vocabularies. the standard of the generated data usually faces some special challenges. Data could cause uncertainty and inconsistency as sensors and RFID tags would produce inaccurate readings and redundant readings, or perhaps miss readings. Traditional databases management systems (DBMSs) might be adopted for storing IoT data, but must address the high processing and querying frequency. the event of large-scale, distributed storage systems is additionally raised to fulfill the exceptional demands of knowledge storage in IoT and three factors have to be considered: consistency, availability and partition tolerance. The storage issue in resource-constrained IoT scenarios also plays a very important role thanks to the mobility and scalability of IoT data. Antelope2 is that the first DBMS for resource-constrained sensor devices, which enables a category of sensor network systems where every sensor holds a database. Linked Data5 may be a method for publishing structured data and interlink such data to create it more useful. It builds upon standard Web technologies like HTTP, RDF and URIs and extends these technologies to share information. Data from different sources will be connected and queried within the style of Linked Data. The concept of Linked Stream Data applies the Linked Data principles to streaming data, in order that data streams will be published as a part of the net of Linked Data the main focus of the complex event processing (CEP) model is on detecting occurrences of particular patterns of low-level events indicating some higher-level events, which are better understood by computers and humans.

C. *IOT Search*: -

Searching and finding relevant objects from billions of things is one amongst the main challenges within the IoT era because the supporting technologies for searching things in IoT are very different from those utilized in searching Web documents thanks to tightly bounded contextual information (e.g., location) and no easily indexable properties of IoT objects. additionally, the state information of things is dynamic and rapidly changing. By reusing techniques of the planet Wide Web, the knowledge and services of IoT objects are often provided on the net. This triggers the research of Web of Things (WoT) search engines (WoTSE), which is applying Web technologies to the net of Things to access information and services of physical objects. In WoT, each object possesses a digital counterpart that's commonly spoken as "Digital Twin". These digital twins are built in line with Representational State Transfer (REST) architecture and accessed with HTTP protocol via RestFul API. Research associated with WoTSE begins from early 2000s and enjoys steady expansion ever since. In early projects, WoTSE are commonly wont to locate physical objects, which are tagged with passive RFID tags or sensor nodes. Dyser is one amongst the works that search physical entities supported their real-time states derived from their sensor readings. The work of CASSARAM demonstrates the endeavour on sensor search. The whole system is protected by security, privacy, and trust assessment measures, which are grouped into a vertical layer. To be more specific, the invention Layer is interfaces to the net resources including sensor streams, representations, functionalities, websites and Web services. The Index Layer stores and indexes resources with its Collection Manager and Indexer modules. This layer also ranks the resources.

D. *Security, Privacy, and Trust in IOT: -*

The risk on data security and privacy exponentially increases with an unprecedented growth within the deployment of the smart IoT objects. one in all the distinct challenges within the IoT infrastructures is that the limited computation power and minimal resources of most of the IoT devices. These limited resources preclude the state-of-the-art cryptographic techniques that are indispensable for securing IoT devices, thereby making them liable to a various range of security attacks, like the denial-of-service attacks and privacy attacks like data exfiltration or leakage attacks. Recently, there are numerous research proposals within the literature delineating on IoT security and privacy services like. Nevertheless, there are still open security gaps that need appropriate controls to mitigate them. The challenge is that the currently proposed systems don't provide a whole security solution that tackles all IoT security and privacy requirements. for example, most of the proposed methodologies target one or two security requirements, e.g., confidentiality and authentication. An efficient and reliable IoT data sharing requires an all-inclusive security solution for securing the information while limiting the interference that may occur if integrating several independent techniques to supply the

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specified services. To the simplest of our knowledge, none of the proposed research methodologies or industry systems contribute a security attack free solution that gives conditional anonymous authentication and fine-grained access control techniques to be employed by the resource-constrained IoT devices and infrastructures. There are variety of challenges confronting the safety of IoT infrastructure, including but not limited to, scalable security, denial of use of service or upload of information, and interoperability. Scalability is one in all the indispensable requirements within the IoT infrastructures. Such a requirement is often met by delegating the expensive cryptographic computations in an exceedingly secured manner to a cloudlet, edge, or cloud. there's thus a dire need for investigating intelligent ways to use edge computing with IoT and therefore the cloud to handle the present security challenges of IoT systems. Moreover, IoT security research studies should think about using cryptographic methodologies with limited communication overhead, like constant size Attribute Base Encryption techniques. Non-repudiation is another essential requirement for IoT infrastructure, specifically for systems that include users' interaction. Non-repudiation should be imposed to stop users from denying either the utilization of the service or previous data upload.

E. *Service Computing and IOT*: -

Initiated round the similar time because the Internet of Things, service computing (or service-oriented computing) has been established as a vital paradigm to alter the way of design, delivery, and consumption of software applications. Service computing relies on service-oriented architecture (SOA) and aims to prepare software applications and infrastructures into a group of interacting services, which are then used as fundamental elements to support low-cost and efficient development of distributed applications. Technologies on service computing (e.g., RESTful services and repair composition methods) can help address several fundamental challenges presented by IoT including communication and management of IoT objects. However, marrying service computing and IoT presents challenges thanks to their technical constraints and unique characteristics. On the one hand, IoT objects is also resource-constrained and therefore the traditional service computing standards and techniques (e.g., SOAP, WSDL, BPEL) may be too heavy to be applicable in IoT. On the opposite hand, existing service composition models cannot be directly used for IoT interoperation, because of their architectural differences. More specifically, traditional service composition models are mostly single-typed and single layered (i.e., services), while IoT components are heterogeneous, multi-layered that include not only services, but also IoT devices and other components. One important research direction centers on IoT services discovery, attending to be ready to find the correct IoT services at the correct time and therefore the right location. There are two possible techniques. the primary technique is semantic annotation for IoT service descriptions and their associated sensory data. One research challenge during this direction is that the cosmos ranking of IoT contents. cosmos ranking sorts contents by their intrinsic characteristics, instead of their relevance to a given query, thereby having the ability to deliver the foremost relevant results. One well-known example of macrocosm ranking is PageRank, which orders sites supported their importance via link analysis. Given the scale of IoT (50 to 100 times bigger than this Internet), one promising direction is to develop a replacement world ranking mechanism for the IoT contents so as to produce an efficient and efficient IoT service discovery.

F. *Social IOT*: -

Recently, there are quite number of independent research activities to bring the following evolutionary step of the IoT paradigm by moving from smart objects to socially aware objects. This refers to creating a replacement generation of IoT objects that manifests themselves and have the potential to socialize with the encircling peers mimicking masses for the sake of, but not limited to, discovering new services, exchanging experience, and making the foremost of 1 another capability. This new paradigm is stated because the Social Internet of Things (SIoT), which can be a brand-new perspective that allows objects to work out their own social networks and navigate through the social network structure of the friend objects, allowing discovering other objects and their services. Unlike this process in IoT where search engines are employed to hunt out services in an exceedingly centralized way, SIoT can foster resource availability and make services discovery more easily in a very very distributed manner. This paradigm also aims to provide reliable and trustworthy networking solutions by utilizing the social network structure. supported the system established among IoT objects, objects can inquire local neighbourhood for other objects to assess the reputation of these objects and establish grade of trustworthiness. Additionally, SIoT enables objects to start out out new acquaintance where they'll exchange information and skill. SIoT isn't a spur of the moment. there are earlier attempts to involve devices within the social loop. Back to 2001, Holmquist et al. established temporary relationships between wireless sensors. within the work of, the authors discussed the thought of how objects can blog. Moreover, kranz et al. enabled objects to share content employing a social network framework Twitter. Guinard et al. utilized the human social network as a framework for owners to share the services of these devices with their friends. Previous attempts differ from the intended perspective of this vision of SIoT. SIoT isn't a spur of the instant. Previous attempts differ from the intended perspective of the present vision of SIoT. the present perspective refers to a brand-new generation of IoT objects that have capability to create their own social network of friends without wishing on the net human social networks. They proposed a conceptual platform on a way to enable IoT objects to make relationships among one another.

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III. CONCLUSION

The Internet of Things (IoT) has been an extremely active area of research and development for more than two decades. Although a wealth of exciting activities including standardization, commercial developments and research have been conducted, many challenges still remain open due to the large scale and diversity of IoT devices, the openness of the IoT environment, and the security and privacy concerns. In this paper, we identify 10 key research topics on IoT and hope to stimulate further research in this vibrant area.

REFERENCES

[1]. V. M. Rakhade, "Reducing Routing Distraction in IP Network using Cross-Layer Methodology". International Conference on Recent Trends in Engineering Science and Technology (ICRTEST) 2017, vol 5, issue 1.
[2]. L. N. Yadav, "Predictive Acknowledgement using TRE System Reducing Costs and Bandwidth".
[3]. Sohel M. Sheikh, "Internet of things research challenges and future scope", vol 11, Issue 5, may 2022, DOI:10.17148/IJARCCE.2022.115150.
[4]. S. Hasan, S. O'Riain, and E. Curry, "Towards Unified and Native Enrichment in Event Processing Systems," in Proc. of the 7th ACM International Conference on Distributed Event-Based Systems (DEBS 2013), Arlington, TX, USA, 2013, pp. 171–182.
[5]. Q. Zhou, Y. Simmhan, and V. K. Prasanna, "Towards an Inexact Semantic Complex Event Processing Framework," in Proc. of the 5th ACM International Conference on Distributed Event-Based Systems (DEBS 2011), New York, NY, USA, 2011, pp. 401–402.
[6]. D. Anicic, P. Fodor, S. Rudolph, and N. Stojanovic, "EP-SPARQL: A Unified Language for Event Processing and Stream Reasoning," in Proc. of the 20th International Conference on World Wide Web (WWW 2011), Hyderabad, India, 2011, pp. 635–644.
[7]. J. Calbimonte, O. Corcho, and A. J. G. Gray, "Enabling Ontology-Based´ Access to Streaming Data Sources," in Proc. of the 9th International Semantic Web Conference (ISWC 2010), Shanghai, China, 2010, pp. 96– 111.
[8]. Y. Zhang, M. Pham, O. Corcho, and J. Calbimonte, "SRBench: A´ Streaming RDF/SPARQL Benchmark," in Proc. of the 11th International Semantic Web Conference (ISWC 2012), Boston, MA, USA, 2012, pp. 641-657.
[9]. Q. Z. Sheng, X. Li, and S. Zeadally, "Enabling Next-Generation RFID Applications: Solutions and Challenges," IEEE Computer, vol. 41, no. 9, pp. 21–28, 2008.
[10]. M. Novak, "Nikola Tesla's Incredible Predictions for Our Connected World." [Online]. Available: https://paleofuture.gizmodo.com/ nikolateslas-incredible-predictions-for-our-connected-1661107313.