Volume 8, No. 5, May-June 2017
ISSN No. 0976-5697
International Journal of Advanced Research in Computer Science
REVIEW ARTICLE
Available Online at www.ijarcs.info

IoT- Architecture and its Technical Issues

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Abstract: Needless to say that the current hype around the Internet of Things (IoT) is diverse. Everyday some new IoT enabled product is launched by the Companies which shows the market is moving so rapidly day by day. This paper provides basic idea of Internet of Things- Framework, Strategies and usage of IoT in our day to day life.

Keywords: IoT, Security, Network, Architecture, Gateway

INTRODUCTION

Internet of Things could be defining as the interconnection of everything that can be connected anywhere with the people, data, process and the things (devices). These things or devices collect and exchange data on the Internet [1,5].

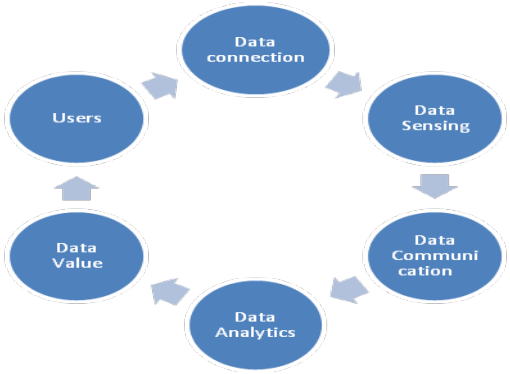

Figure: IoT Proces

PRE-REQUISITE TO BUILD IoT STRATEGY [2,8]

1. IoT Security

As companies collect data beyond traditional IT boundaries, IoT security measures will be critical. Some key considerations include being able to secure and monitor devices, encrypt sensitive data, and build risk mitigation into systems.

2. Streaming Data

IoT applications accumulate more data than traditional batch processing can manage. Having capabilities for streaming data continually is key to
reliably feeding real-time business processes and extracting timely insights

3. IoT Platform

An IoT platform makes it possible to develop, deploy, and manage IoT and M2M applications. Automate processes and network connections, store and manage sensor data, connect and control your devices, and analyze your data.

4. IoT Applications

"Next generation" IoT applications must be able to capture, collect, interpret, and act on vast amounts of information – detecting connectivity gaps, handling interruptions, and meeting specific business and industry requirements.

5. IoT Cloud

IoT cloud solutions provide affordable access to high-speed data networks – to significantly extend the reach and usability of your IoT applications. They can also offer data storage, processing, analysis, and remote device management

6. IoT Data

IoT data management technologies ensure that you can collect the right data at the right time, even when connectivity is interrupted. Rely on in-memory systems to process massive data volumes generated by thousands of devices

ARCHITECTURE

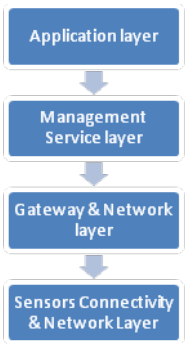

Figure: Architecture of Iot [6,7,10]

1. Sensor Connectivity & Network Layer: This is the base layer of the architecture which provides identification to the objects by assigning a unique IP address. It consists of data sensors like RFID, barcodes which are used to create a sensor network.
2. Gateway & Network Layer: This layer receives the digital signals the sensor networks and transmit it to the Gateway through various networks such as: WAN (GSM, LTE, LTE-A, UMTS), Bluetooth, NFC, Zigbee, etc.
3. Management Service layer: The management Service layer stores, analyze and processes large amount of data. It manages and provides a varied set of services like data flow management, Security Control, databases, big data modules,

device modeling configuration & management, cloud computing etc.

4. Application layer: Application layer is responsible for providing application specific service to the user. The IoT related applications includes transportation, environmental, healthcare, people tracking, smart homes, smart planet etc.

TECHNICAL CHALLENGES

1. Scalability: Scalability is the ability of the systems or the network which could handle an increased amount of work and can accommodate that expansion [3,4,9]. The Internet of Things are bigger as compared to the internet of Conventional Systems, but both the systems communicate and can perform functions uniformly for both the large as well as for small level with the help of three steps, these are [3]:

- Aligning the network and device longevity.
- Creating a system which can be expanded easily.
- Durability of the devices.

2. Interoperability: Interoperability is the ability of the system which can work with other systems regardless of the different software or the hardware. Also an IoT world is extremely huge and each object could have different features, processes, data. To make them compatible common practices and standards are needed.

3. Software complexity: A broader programming framework will be required on the system and on locale servers with a specific end goal to deal with the objects and give services to support them on the grounds that the product frameworks in objects should work with least resources, as in conventional embedded systems

4. Data volumes: Since the IoT is very diverse it requires many operational mechanisms for the storage, processing and managing the data.

5. Data interpretation: For supporting users, the local context commanded from the sensors should be interpreted as precisely as feasible. The source of generating constructive information is raw sensor data that can fire actions without any insignificant responsibility.

6. Security and personal privacy: The security and personal privacy could occur due to:

a) Unauthorized data access
- Internet Threats
- Denial of service(DoS) attack

b) Network
- Unauthorized data access
- Unauthorized service access
- Modification of the communication information
- Viruses or malware attacks

c) Back-end of Information systems
- Safety procedures for code
- substitution of operators

7. Fault tolerance: Iot devices are very dynamic and are changing frequently in surprising ways. But it is important for the systems to perform functions efficiently. Redundancy is required in some phases to construct a reliable and a strong Iot which can help to adopt the changed conditions automatically [11].

8. Power supply: Energy Saving is the most concerned part for the power supply in system architecture, hardware as well as in software such as: During the operation of Protocol Stack , the existence has to be justified for each and every transmitted byte

9. Interaction and short range communication: Wireless Connection for small range requires less power supply, simple addressing and involves no threat of being heard by others. Example. RFID, NFC,

10. Wireless communications: The wireless technologies like Wi-Fi, Bluetooth, UMTS and GSM are not much suitable from energy perspective. There are some WPAN standards like ZigBee that works on low power and provides narrow bandwidth which further helps to save the energy [11].

CONCLUSION

The numbers of Devices are increasing rapidly day by day; more automation and upgradations will be required for both the user and the Industries. With the high increase in the automations, hardware vulnerabilities (Security& Privacy) will also increase. The World Wide Web (www) has transformed into IoT world where everything is connected to the Internet.

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