Assignment – 2
IoT
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Tutorial Paper:
Paper Subject: A Survey of Emerging M2M Systems: Context, Task, and Objective
Paper link: https://doi.org/10.1109/JIOT.2016.2582540

Key Contributions/Findings/Conclusions

1. Categorised M2M systems into M2M Task(Device-Centric and System-Centric M2M Systems), M2M Context (Dynamic and Static M2M Systems), M2M Objective (Performance or Consumption based M2M Systems)
2. A context-task-objective investigation of theoretical and practical implementations.
3. Challenges like – Concurrent Transmissions and network congestions, heterogeneity and management of devices, M2M and H2H coexistence and resource allocation scenarios, QoS and User Satisfaction as utility of M2M
4. Discusses different M2M implementations and their use-cases along with communication networks and architectures.

Key Technology Insights

1. Machine-to-machine (M2M) systems enable machines or devices to collect data, exchange information, and share the data with other devices automatically to achieve certain goals.
2. M2M – Device, Gateway, Server, Communication network interoperability and domain standardization by ETSI
3. M2M systems are loosely coupled machines, and require different topology and setup according to the use-case
4. M2M can use a nearby device and form a D2D link, also, M2M can offload management and configuration tasks to cloud/data centres. In short, M2M are interconnected machines, that exchange data, and can be architected as per need.

Key Insights relevant to Scalable Computing

1. M2M systems are a type of discreet IoT devices that can be scaled according to topology in which they're setup
2. Different scenarios are dicussed in the paper, that explain how M2M is setup for various use-cases and what are its challenges.
3. Vehicular M2M system (ACN), Health Monitoring systems, Robotic Systems (Taxis, Wearhousing, Cleaning Robots), Smart Meters, M2H systems are all examples of M2M systems wherein machine interoperability is exploited.
4. Cost-effectiveness by using existing legacy networks like GPRS/GSM bands top operate can be done.

Review Paper:
Paper Subject: A Reference Model for Internet of Things Middleware
Paper Link: https://doi.org/10.1109/JIOT.2018.2796561

Key Contributions/Findings/Conclusions

1. Discusses the Functional and Non-Functional requirements of IoT Middleware System
2. Discusses different IoT platforms (25 in total)
3. Provides a reference model for the IoT middleware imposing emphasis on Security in the middleware through 4 different techniques
4. Discusses difficulties in achieving a universal standard for IoT, and differentiates IoT from regular Internet.

Key Technology Insights

1. CoAP and MQTT are discussed on the based of their implementation, use cases and their protocol designs and interoperability
2. IoT middleware SDKs like OpenIoT, Amazon IoT Platform, Losant, Devicehive etc are discussed in terms of Application Enablement, App development and Device Management Platforms.
3. Reference model suggests that IoT should use NoSQL as their choice of database as it is faster and malleable
4. Context-Awareness is being modelled using Web Ontologies e.g. Linksmart, OpenIoT

Key Insights relevant to Scalable Computing

1. Bluetooth 5 and IEEE 802.15.4 are being deployed in IoT solutions due to shortcomings of other technologies.
2. Biggest challenge in deploying IoT is security at rest and security in transit of data. 3 different scenarios based on device authentication and security breach are discussed.
3. Data stored locally is bound to be erased / not available in case of failure, therefore better techniques to relay the data stored either by pub/sub or through a technique to contact the cloud have to be adopted.
4. A middleware offshores the computing and provides a common communication platform to the heterogenous IoT devices.