

IoT challenges

State of the art

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Outline

1. Introduction

2. State of the art

3. Conclusion

Context

Introduction

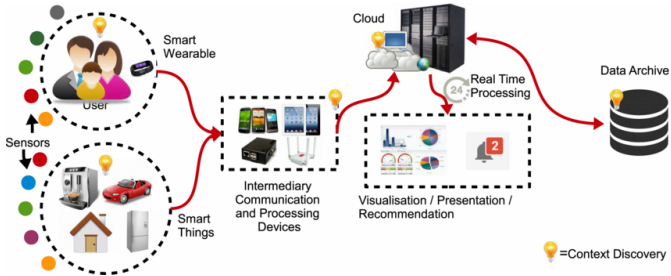


Figure 1: The IoT Platform

- ➡ Connect sensors to the gateway.
- ➡ Connect the gateway to the infrastructure.
- ➡ Store & Analyze sensors data.

Problematic

Introduction



Figure 2: The IoT problematics

- ➡ How to communicate sensors efficiently
 - ➡ IEEE 802.15.4, 6LowPAN
 - ➡ Throughput, Delay, Jitter, Loss rate and Availability.
- ➡ How to communicate sensors with the infrastructure efficiently
 - ➡ LPWAN, LoraWan
 - ➡ Heterogeneity ?
- ➡ How to extract knowledge from sensors data.
 - ➡ Data mining: Classification, Clustering
 - ➡ Deep learning: Machine learning

Problematic

Introduction



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- 1. Heterogeneity
- 2. Security

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1. Heterogeneity

2. Security

Literature review

Related work

- [1] Many studies have identified **SDN** as a potential solution to the WSN challenges, as well as a model for **heterogeneous** integration.
- [1] This **shortfall** can be resolved by using the **SDN approach**.
- [2] **SDN** also enhances better control of **heterogeneous** network infrastructures.
- [2] Anadiotis et al. define a **SDN operating system for IoT** that integrates SDN based WSN (**SDN-WISE**). This experiment shows how **heterogeneity** between different kinds of SDN networks can be achieved.
- [2] In cellular networks, OpenRoads presents an approach of introducing **SDN** based **heterogeneity** in wireless networks for operators.
- [3] There has been a plethora of (industrial) studies **synergising SDN in IoT**. The major characteristics of IoT are low latency, wireless access, mobility and **heterogeneity**.
- [3] Thus a bottom-up approach application of **SDN** to the realisation of **heterogeneous IoT** is suggested.
- [3] Perhaps a more complete IoT architecture is proposed, where the authors apply **SDN** principles in IoT **heterogeneous** networks.
- [4] it provides the **SDWSN** with a proper model of network management, especially considering the potential of **heterogeneity** in SDWSN.
- [4] We conjecture that the **SDN paradigm** is a good candidate to solve the **heterogeneity** in IoT.

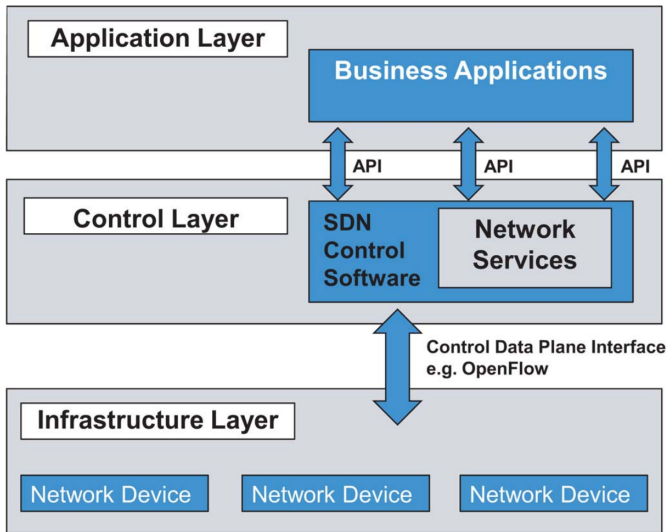


Figure 3: Architecture and technology abstraction.

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Security in SDN

related work

WSN OSI Layer	SDN Plane	Threat
Application	Application	Poor Authentication and Control
		Fraudulent flows rules insertion
		Poor access control and accountability
		Malicious Application
		DoS
		Northbound Interface (API) attack
Transport	Control	Threats from applications
		DoS
Network		Unauthorised access
		Scalability & Unavailability
		Faulty or Malicious controller
Data Link	Data	Unauthorised access
		Fraudulent rules
		Forged/False traffic flows
		Flooding, Spoofing
Physical		Southbound Interface (API) attack
		Jamming, Tampering
		Sybil
		Compromised/hi-jacked controller
		Malicious node

Table: SDN vs OSI layer

SDN based sensor network

Management architecture	Management feature	Controller configuration	Traffic Control	Configuration and monitoring	Scapability and localization	Communication management
[5] Sensor Open Flow	SDN support protocol	Distributed	in/out-band	✓	✓	✓
[6] SDWN	Duty sycling, aggregation, routing	Centralized	in-band	✓		
[7] SDN-WISE	Programming simplicity and aggregation	Distributed	in-band		✓	
degante_smart_2014a	Efficiency in resource allocation	Distributed	in-band		✓	
SDCSN	Network reliability and QoS	Distributed	in-band		✓	
TinySDN	In-band-traffic control	Distributed	in-band		✓	
Virtual Overlay	Network flexibility	Distributed	in-band		✓	
Context based	Network scalability and performance	Distributed	in-band		✓	
CRLB	Node localization	Centralized	in-band			
Multi-hope	Traffic and energy control	Centralized	in-band			✓
Tiny-SDN	Network task measurement	-	in-band			

Table 1: SDN-based network and topology management architectures. [3]

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Conclusion

- ➡ Heterogeneity is a big challenge in IoT environment, like mobility, scalability, QoS and security.
- ➡ I propose to use SDN (SDN-WISE) to manage heterogeneity.
- ➡

Conclusion

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- ➡ I propose to use SDN (SDN-WISE) to manage heterogeneity.
- ➡

Thank you !

References

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