IoT challenges

State of the art

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LIGM/ESIEE Paris

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Outline

1. Introduction

2. State of the art

3. Conclusion

4. State of the art

5. First contribution

6. Second contribution

7. Conclusion

1. *Context

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Context

Introduction

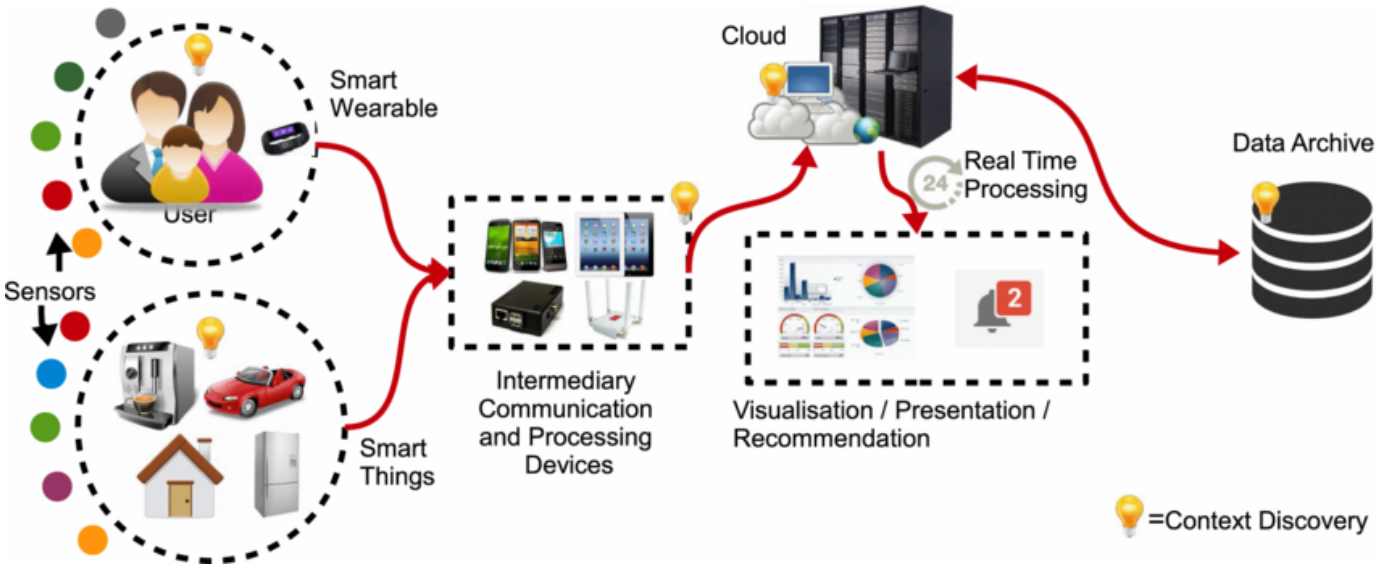

Figure 1: The IoT Platform

- [1] Connect sensors to the gateway[1].
- Connect the gateway to the infrastructure.
- Store & Analyze sensors data[2].

[1] Musa Ndiaye, Gerhard Hancke, and Adnan Abu-Mahfouz. " Software Defined Networking for Improved Wireless Sensor Network Management: A Survey ". In: 17.5 (May 4, 2017). 00053, p. 1031.

[2] Pascal Thubert, Maria Rita Palattella, and Thomas Engel. " 6TiSCH Centralized Scheduling: When SDN Meet IoT ". In: *2015 IEEE Conference on Standards for Communications and Networking (CSCN)*. 2015 IEEE Conference on Standards for Communications and Networking (CSCN). 00033. Tokyo, Japan: IEEE, Oct. 2015, pp. 42–47.

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

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

Motivations

Introduction

- First Motivation
  - First Motivation
    - First Motivation
    - Second Motivation
  - Second Motivation
- Second Motivation
  - First Motivation
  - Second Motivation
- Third Motivation
  - First Motivation
  - Second Motivation
- Fourth Motivation
  - First Motivation
  - Second Motivation

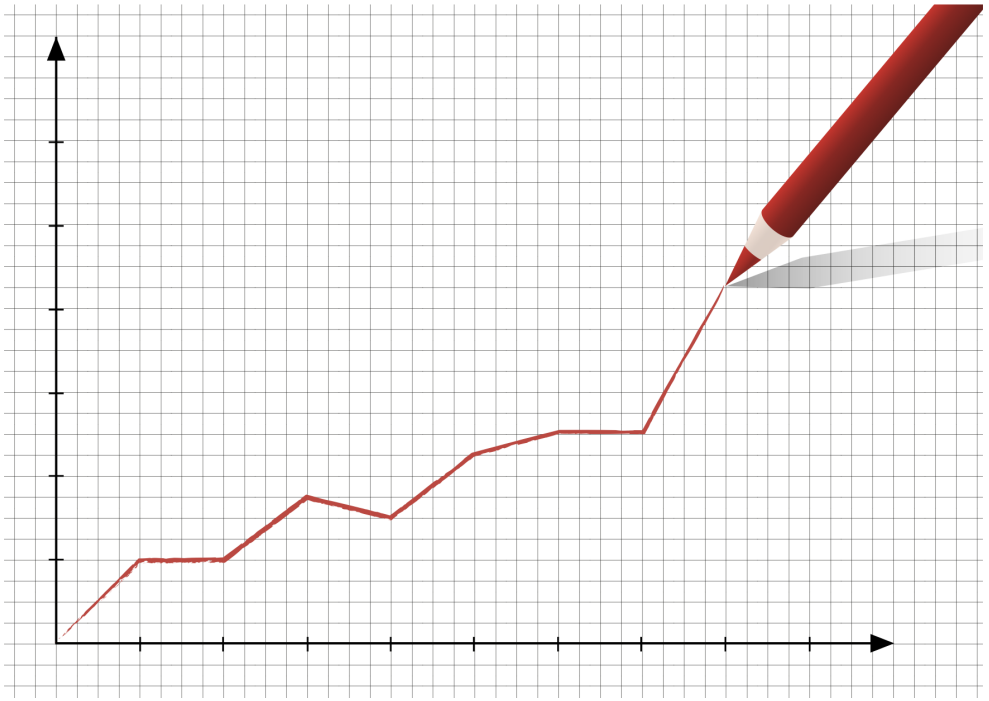

Figure 3

Goals

Introduction

- First goal
  - First goal
    - First goal
    - Second goal
  - Second goal
- Second goal
  - First goal
  - Second goal
- Third goal
  - First goal
  - Second goal
- Fourth goal
  - First goal
  - Second goal

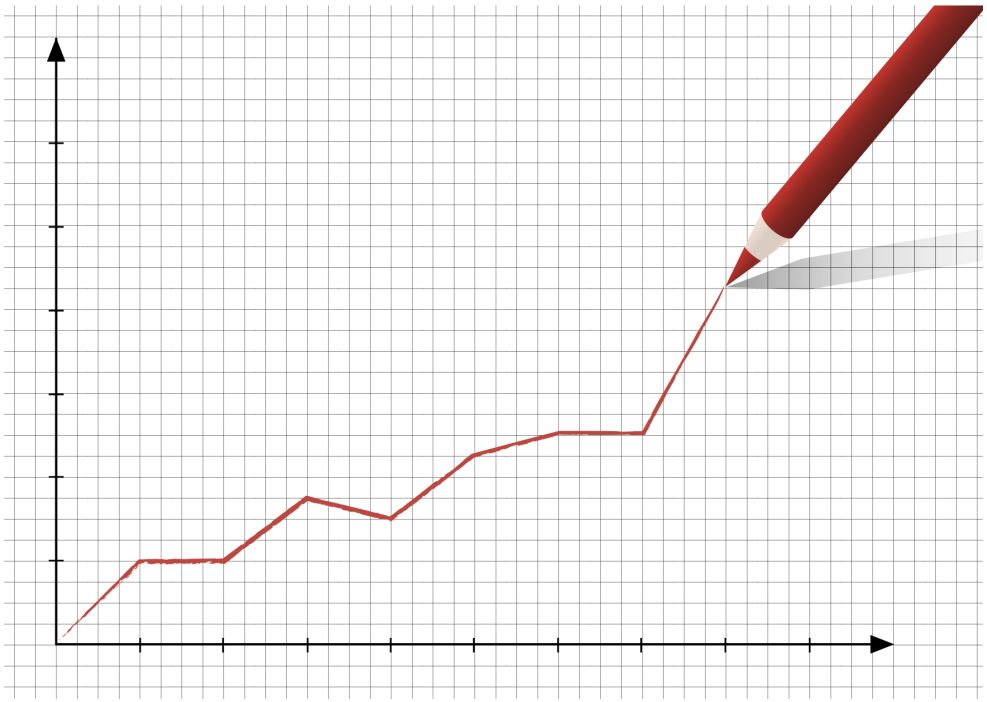

Figure 4

Challenges

Introduction

- First Challenge
  - L'objectif est de réduire le taux de mortalité
  - L'objectif est de rendre nos route plus sure
- Second Challenge
  - Connecter les pietons et le vehicule
  - augmenter la présision GPS
  - réduire la latence
- Third Challenge
  - Connecter les pietons et le vehicule
  - augmenter la présision GPS
  - réduire la latence

Contributions

Introduction

- First contribution
  - Privacy settings
  - Information propagation
  -
- Second contribution
  - Privacy settings
  - I
- Third contribution
  - Privacy settings
  - I

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2. Application protocols
3. Service discovery
4. Network layer
5. Link & Physical layer

State of the art

Standardization

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Related work

Comparison

Paper	A1	A2	A3	A4

Table 1: An example table.

Related work

Comparison

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... (step 1)

Methods

- Privacy threats
  - Privacy settings
  - Information propagation
  -
- Privacy protection
  - Privacy settings
  - I

... (step 2)

Methods

- Privacy threats
  - Privacy settings
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... (step 4)

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Results

Comparison

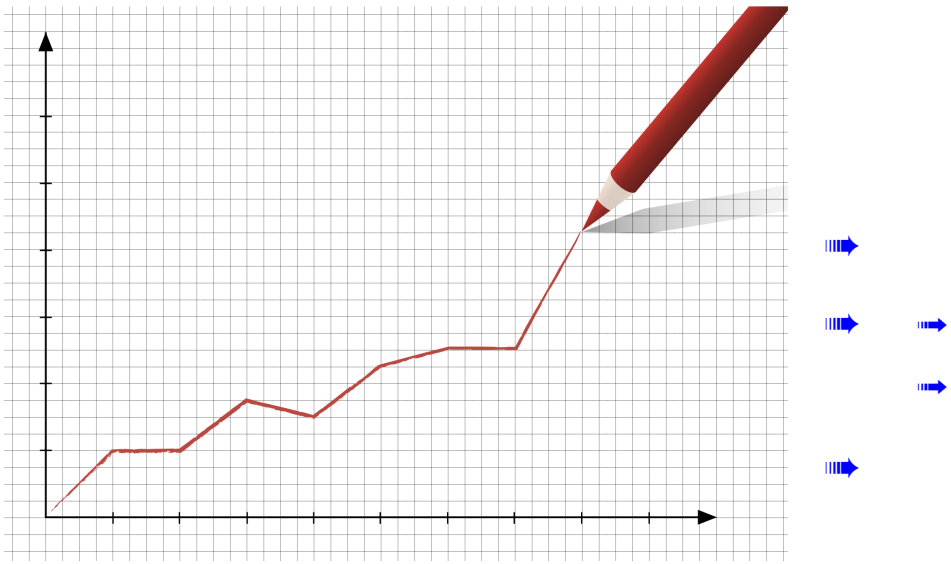

Figure 5

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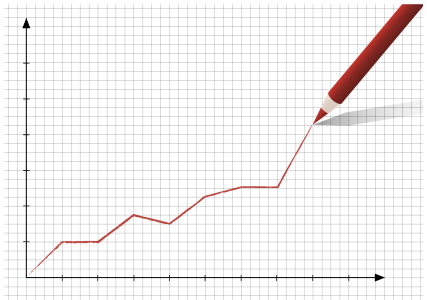
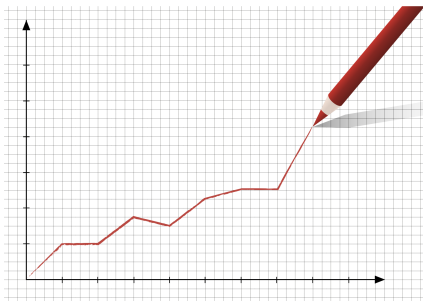


Figure 6: Cag.



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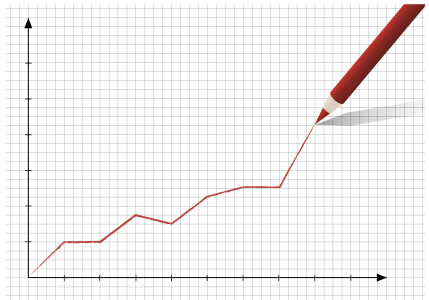

Figure 8: Cag.

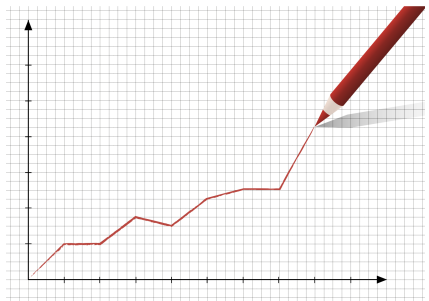

Figure 9: Cag.

Challenges

Conclusion

- Privacy threats
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  - Information propagation
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... (step 3)

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... (step 4)

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Results

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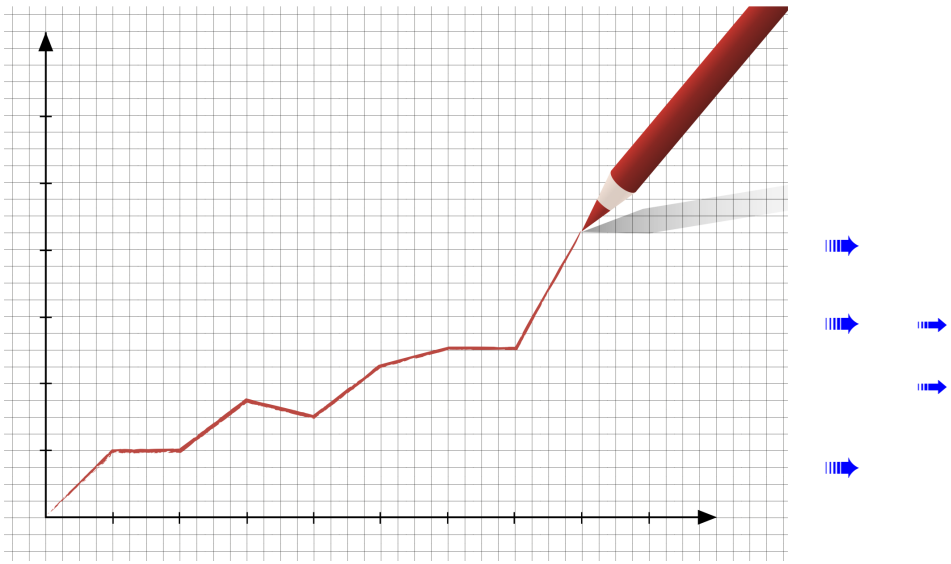

Figure 10

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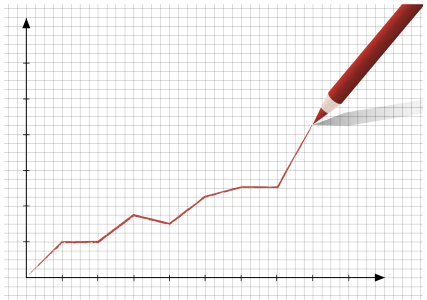

Figure 11: Cag.

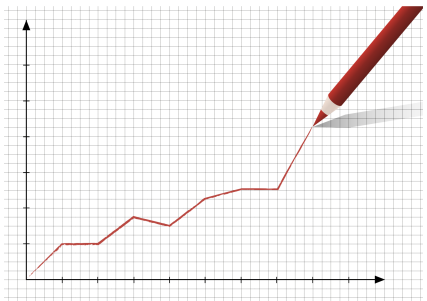

Figure 12: Cag.

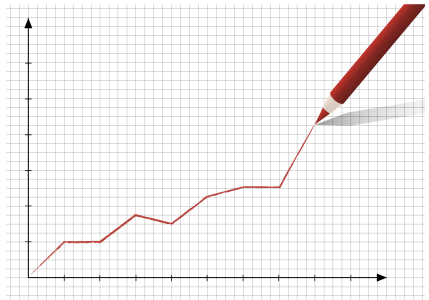

Figure 13: Cag.

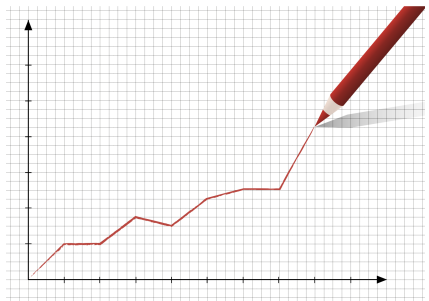

Figure 14: Cag.

Challenges

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Conclusion

Routing protocol	Control Cost	Link Cost	Node Cost
OSPF/IS-IS	✗	✓	✗
OLSRv2	?	✓	✓
RIP	✓	?	✗
DSR	✓	✗	✗
RPL	✓	✓	✓

Table 5: Routing protocols comparison [_**rpl2**_]

Application protocol	Rest-Full	Trans-port	Pub-lish/Sub-scribe	Request/Re-sponse	Secu-rity	QoS	Header size (Byte)
COAP	✓	UDP	✓	✓	DTLS	✓	4
MQTT	✗	TCP	✓	✗	SSL	✓	2
MQTT-SN	✗	TCP	✓	✗	SSL	✓	2
XMPP	✗	TCP	✓	✓	SSL	✗	-
AMQP	✗	TCP	✓	✗	SSL	✓	8
DDS	✗	UDP TCP	✓	✗	SSL DTLS	✓	-
HTTP	✓	TCP	✗	✓	SSL	✗	-

Table 6: Application protocols comparison

Conclusion

Routing protocol	Control Cost	Link Cost	Node Cost
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RIP	✓	?	✗
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RPL	✓	✓	✓

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MQTT-SN	✗	TCP	✓	✗	SSL	✓	2
XMPP	✗	TCP	✓	✓	SSL	✗	-
AMQP	✗	TCP	✓	✗	SSL	✓	8
DDS	✗	UDP TCP	✓	✗	SSL DTLS	✓	-
HTTP	✓	TCP	✗	✓	SSL	✗	-

Table 6: Application protocols comparison

Thank you !

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