The new challenges of the next generation of wireless ubiquitous networks

Nathalie Mitton
New generation of ubiquitous networks
Wireless Ubiquitous Network

- Made of devices spread everywhere that allow objects and our environment to communicate and interact with us.

RFID
Applications
RFID networks

Antenne
(cuivre, aluminium, encre sérigraphiée)

Assemblage
Antenne + Puce

Puce
(silicium)

Encapsulation / Packaging
de l’étiquette radiofréquence
Wireless Ubiquitous Network

• Made of devices spread everywhere that allow objects and our environment to communicate and interact with us.

RFID + wireless sensors
Applications

1) Earthquake or eruption occurs
2) Nodes detect seismic event
3) Each node sends event report to base station
Wireless Ubiquitous Network

- Made of devices spread everywhere that allow objects and our environment to communicate and interact with us.

RFID + wireless sensors + wireless robots
Applications
Our focus

- Robot/actor networks
- Sensor networks
- RFID networks

Sensor and robot/actor networks

Sensor and RFID networks

FUN

Sensor, RFID and robot/actor networks
Challenges

Making these devices:
- Cohabit
- Self-deploy
- Communicate
- Cooperate

and mobility (either controlled or undergone)
Découverte de voisinage

<table>
<thead>
<tr>
<th>node</th>
<th>time</th>
</tr>
</thead>
<tbody>
<tr>
<td>b</td>
<td>2</td>
</tr>
<tr>
<td>c</td>
<td>3</td>
</tr>
<tr>
<td>b</td>
<td>8</td>
</tr>
<tr>
<td>c</td>
<td>3</td>
</tr>
<tr>
<td>e</td>
<td>7</td>
</tr>
</tbody>
</table>
Deploying
Self-deployment

Idea: move on the furthest distance that ensures the maintenance of connectivity with RNG neighbors

results
Enhancing the network performance

results
And so many other challenges

- Dropping resources (where, when, by who)
- Anti-collision mechanisms
- Activity scheduling
- Energy harvesting
- … in 2D and 3D (water, air)
TO HELP US ...
2728 nodes

4 architectures

Mobility by trains or robots
And also, test your own hardware ...
Imagine a world where every object has the capacity to communicate with its environment. Everything can be both analogue and digitally approached - reformulates our relationship with objects — things -- as well as the objects themselves. Any object … relates not only to you, but also … to other objects, relations or values in a database. In this world, you are no longer alone, anywhere.
THANK YOU