CHALLENGED NETWORKING AND DECISION MAKING IN DYNAMIC ENVIRONMENTS

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Work motivations

There is a novel paradigm that has been rapidly gaining interest: the Internet of Things (IoT).

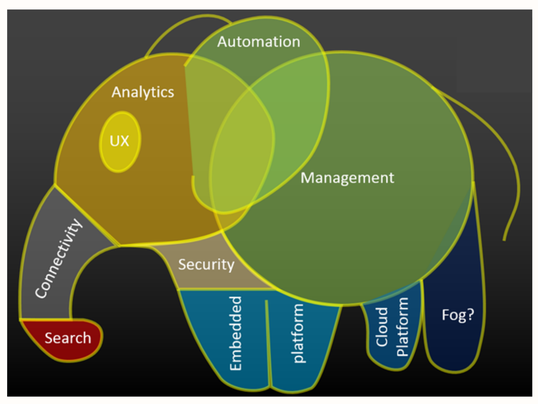

Figure 1: The IoT is a composition of services and technologies [1].

The IoT combines concepts from [2]:

- Ubiquituous computing
- Pervasive networking
- Wireless sensor networks
- Ambient intelligence
- Context-aware systems
- Machine to machine interaction
- ...

This thesis contributes to the advance of IoT technology in practical real-world scenarios by improving communications in complex environments and decision-making in concrete use-cases.

Thesis objectives

The presented work focuses on two aspects of the technologies supporting the IoT paradigm:

- Communications technologies (*Connectivity* in Fig. 1)
  - Communications between *things* are often constrained
  - Challenged networking protocols may be applied
- Decision-making software (*Automation* in Fig. 1)
  - IoT systems monitor and affect their environment
  - True integration of the IoT requires some level of intelligence (i.e. planning or making decisions)

Research plan

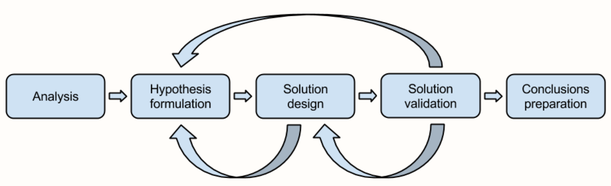

Figure 2: Proposed research plan stages.

Results and discussion

The initial objectives have been satisfied and the results of the research have been published in high impact journals and conferences for both of the working lines identified in the objectives.

Challenged networking

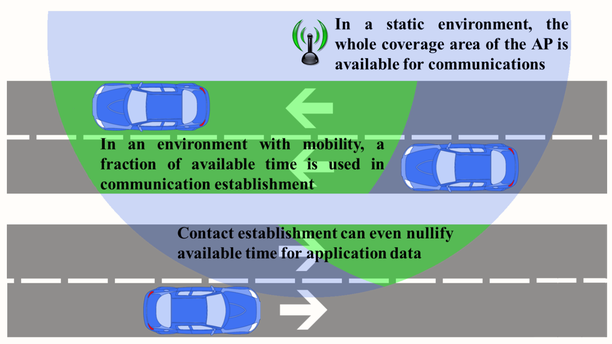

Figure 3: Challenges in a vehicular communications scenario [3].

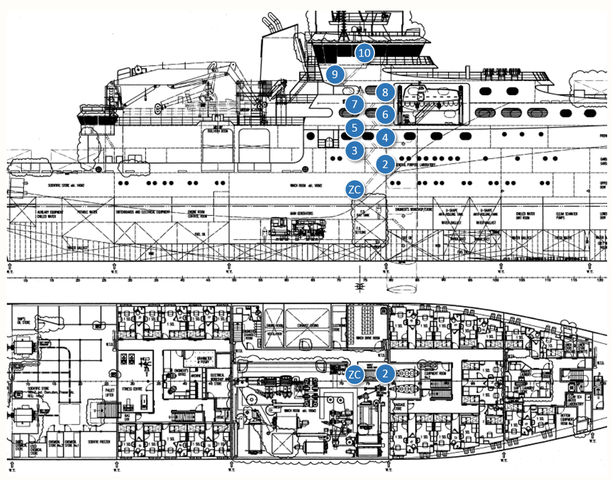

Figure 4: Wireless network for monitoring toxic gases in a shipyard [4].

Decision making

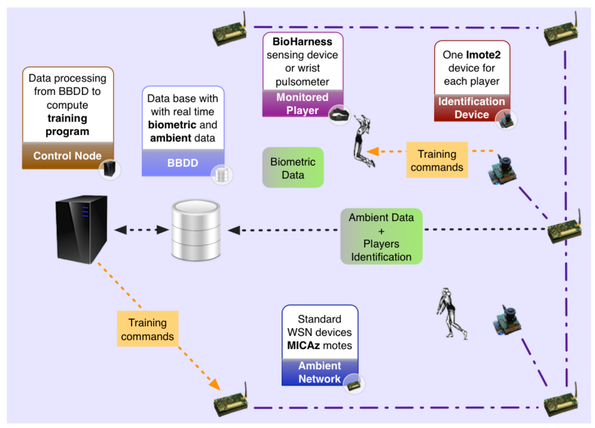

Figure 5: Monitoring and improving professional sports training sessions [5].

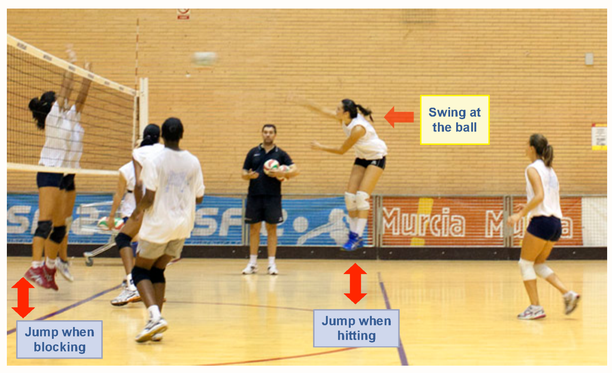

Figure 6: Classifying actions in volleyball training [6].

Next steps

Future research efforts in this line of work may include:

- Analysing the application of the IoT paradigm in additional use cases (Smart Cities, Smart Factories, etc.).
- Integrating IoT and complementary technologies for improved user interaction (Augmented Reality) or improved information management (Big Data).
- Improving the performance of IoT (6LowPAN) networks in large-scale deployments.
- Analysing the emerging paradigm of Fog Computing [7], and its impact on IoT architecture and solutions.

References

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