Assistenza Medicale In COntextual awareness

General Info

Main objective

To develop Ambient Intelligence technologies to support the user with advanced healthcare services at home

Temporal extension and budget

Start
the 1st of April, 2018

End
the 31st of October, 2020

Partners

STMicroelectronics

POLITECNICO MILANO 1863

UNIVERSITÀ DEGLI STUDI FIRENZE

NETCOM GROUP

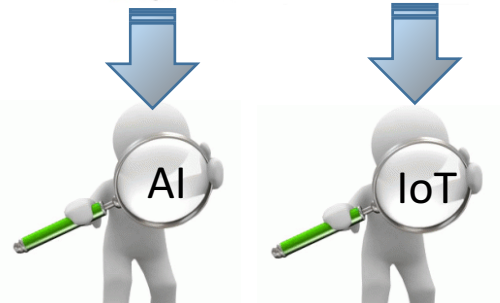
eHealthNet

ROMA TRE UNIVERSITÀ DEGLI STUDI

ICAR CNR

IIT Istituto di Informatica e Telematica del CNR

CNR involvement

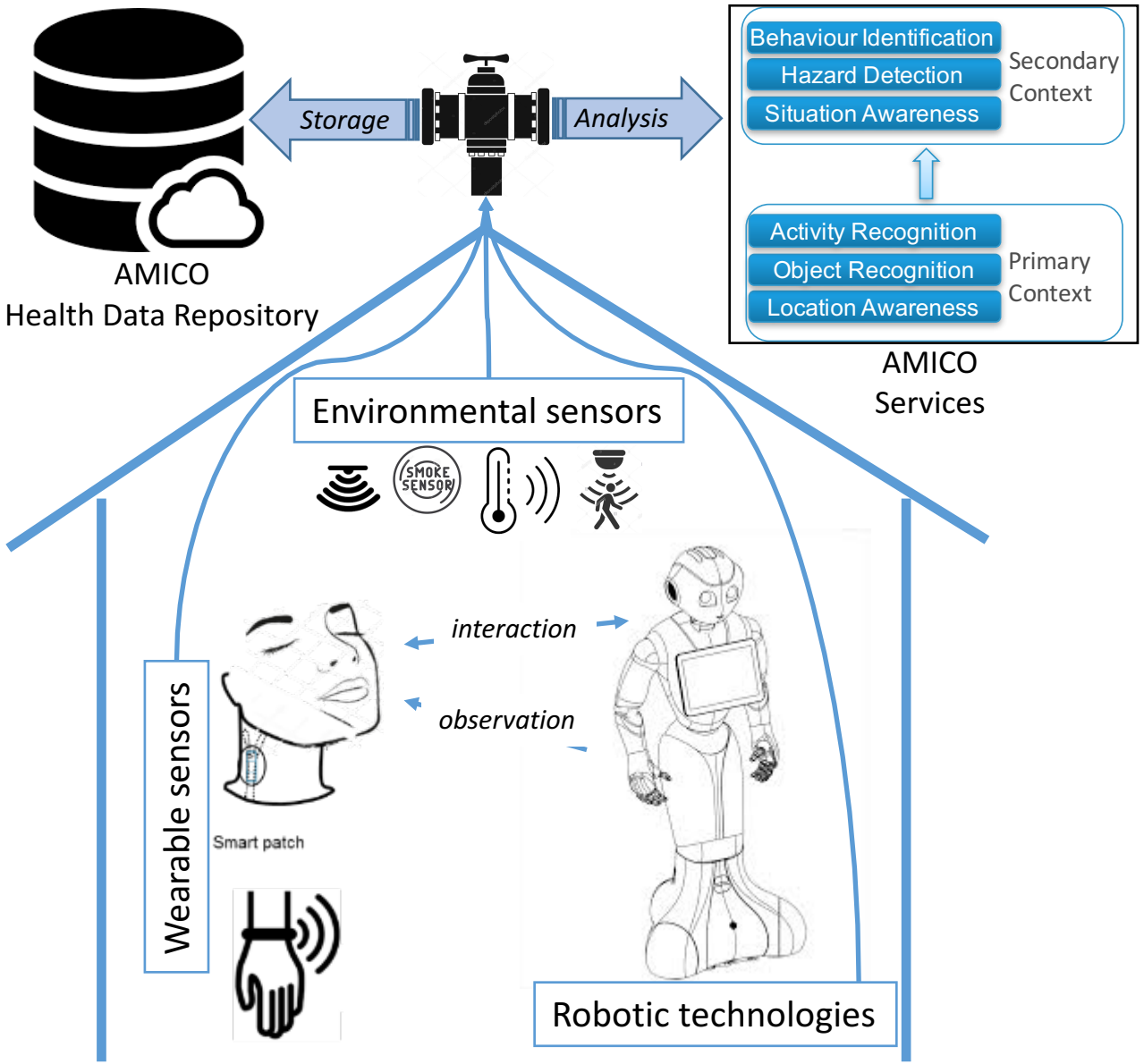


Scenario

Artificial Intelligence

Knowledge discovery

Innovative eHealth services

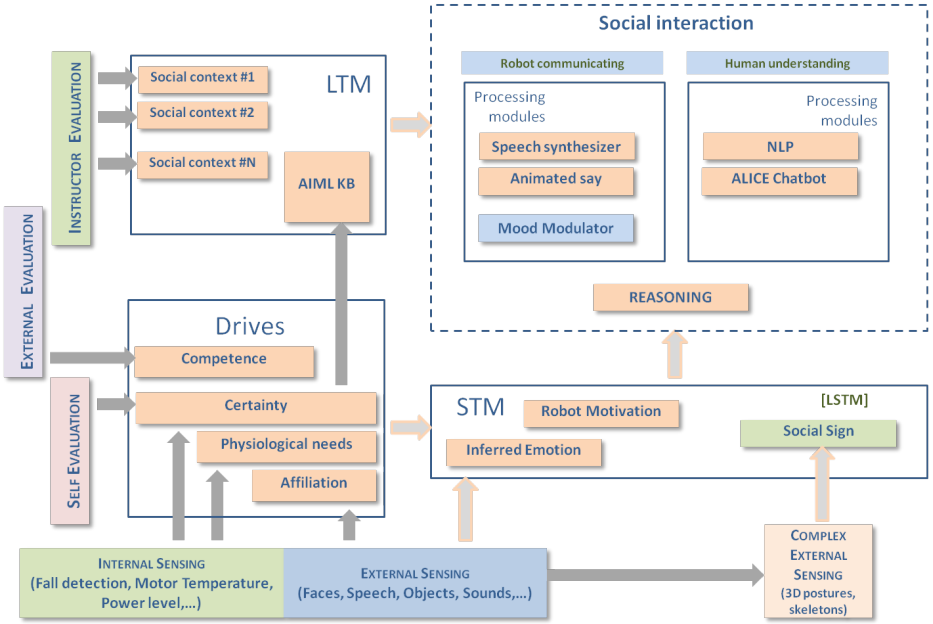


ICAR's contribution (1/3)

Human activity recognition

Results

- A cognitive architecture able to integrate internal and external perception to make available a set of personalized actions
- Implementation of a "cognitive robot" as an enhancement of a commercial technology (*SoftBank Pepper*)



Approaches

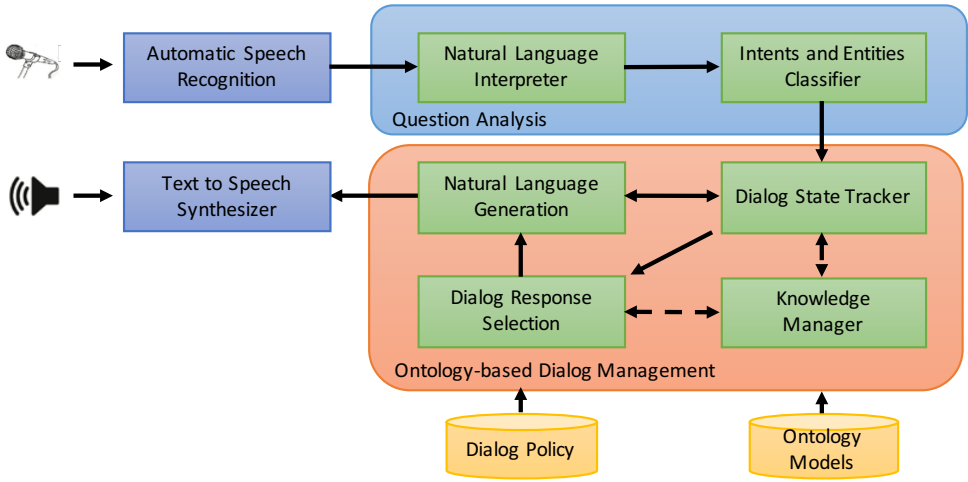
- Combination of unsupervised rule-based approaches and supervised Machine/Deep Learning approaches for facial/gesture/activity analysis
  - SOM and Recurrent Neural Networks
  - Interactive genetic alghoritms
  - Hidden Markov Models

ICAR's contribution (2/3)

Conversational Systems

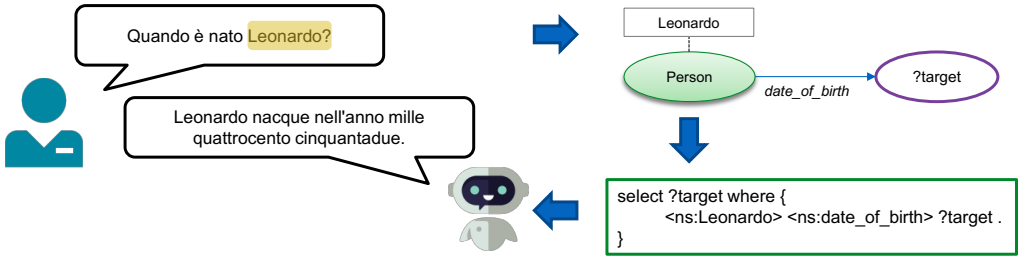
Results

- A conversional system able to:
  - Understand natural language questions also exploiting the dialog context
  - Extract answers from structured information or unstructured documents
- Integration of the conversational system with the cognitive robot



Approaches

- Knowledge-based solutions, where:
  - Domain knowledge is formalized by means of ontologies
  - Question templates codified as research templates on knowledge graphs
  - Deep learning techniques for question classifications



ICAR's contribution (3/3)

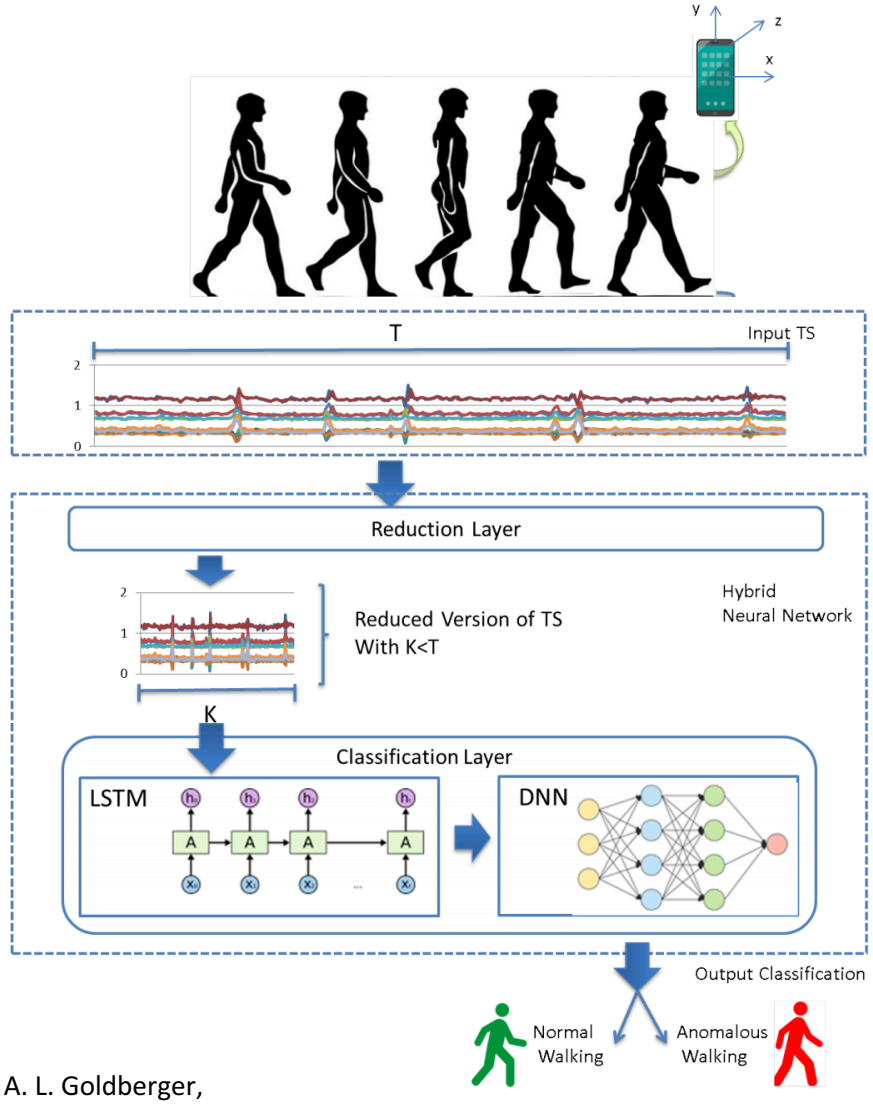
Motion disorders detection

Results

- A system for the human gait analysis able to:
  - Analyze the accelerometer signals in order to identify walking patterns and disorders
  - Assess the fall risk
- Validation of the approach via a public dataset*

Approaches

- Hybrid Machine/Deep Learning approaches:
  - Convolutional Neural Networks
  - Recurrent Neural Networks
  - Deep Neural Networks



* J. M. Hausdorff, A. Lertratanakul, M. E. Cudkowicz, A. L. Peterson, D. Kaliton, and A. L. Goldberger, "Dynamic markers of altered gait rhythm in amyotrophic lateral sclerosis," vol. 88, no. 6, pp. 2045–2053, 2000

THANKS FOR YOUR ATTENTION