R-CoRe:

A Rule-based Contextual Reasoning Platform for AmI

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Reasoning about Context in AmI

- Challenges
  - Imperfect context information
  - Heterogeneous entities
  - Highly dynamic and open environments
  - Distributed context information
  - Unreliable wireless communications
  - ...restricted by the range of transmitters

R-CoRe

- Main Features
  - **Distributed**
  - **Rule-based**
  - **Non-monotonic**
  - **Preference-based conflict resolution**
  - **Dynamic & Adaptive**

- Underlying technologies
  - **Contextual Defeasible Logic (CDL)**
    - a distributed version of Defeasible Logic
  - **Kevoree**
    - a s/w framework for Distributed Dynamically Adaptive Systems

Contextual Defeasible Logic

- Overview
  - The local knowledge of each agent is modeled as a Defeasible Logic theory (**context**)
  - **Mapping rules** enable information exchange between contexts
  - **Preferences** on contexts are used to resolve conflicts caused by the interaction of mutually inconsistent contexts.
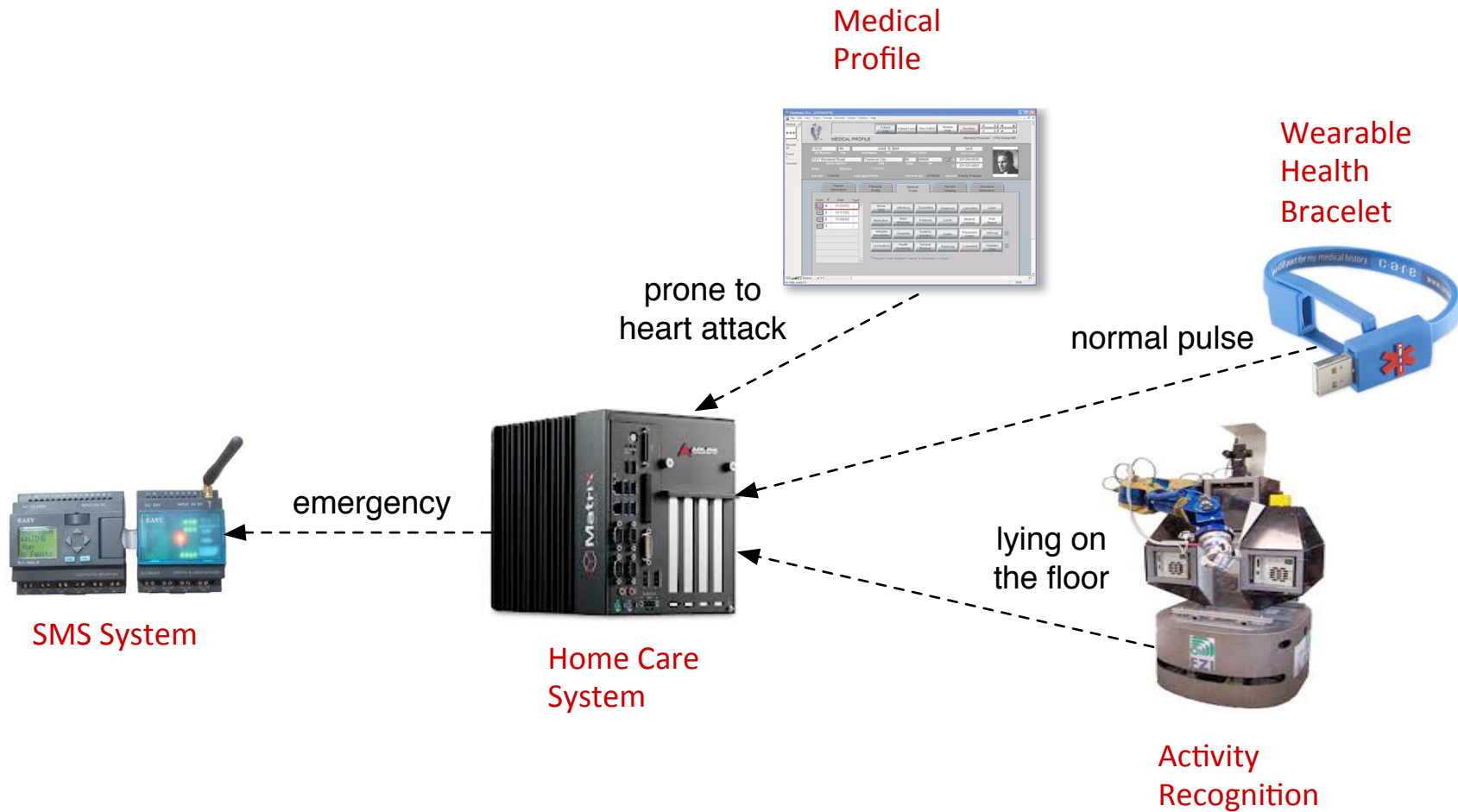
Kevoree

- Overview

  - Open-source software platform

  - Provides tools to build, adapt and synchronize distributed systems

  - Any sensor, software application, web service can be represented as a **component** (with I/O ports)

    - In R-CoRe, each context is implemented as a Kevoree component

  - **Channels** represent different types of communication among components (TCP/IP, email, SMS, etc.)

    - In R-CoRe, contexts exchange information through Kevoree channels

Available at www.kevoree.org

R-CoRe in action

Medical Profile

Wearable Health Bracelet

prone to heart attack

normal pulse

emergency

lying on the floor

SMS System

Home Care System

Activity Recognition

R-CoRe in action

$$r_{\text{med}}^1 : \rightarrow (med : \textbf{proneToHA})$$

$$r_{\text{br}}^1 : \rightarrow (br : \textbf{normalPulse})$$

$$r_{\text{sms}}^{m} : (hcs : \textbf{emergency})$$
$$\Rightarrow (sms : \textbf{dispatchSMS})$$

prone to
heart attack

normal pulse

emergency

lying on
the floor

$$r_{\text{hcs}}^{m1} : (br : \textbf{normalPulse})$$
$$\Rightarrow (hcs : \neg\ \textbf{emergency})$$
$$r_{\text{hcs}}^{m2} : (arm : \textbf{lyingOnFloor}), (med : \textbf{proneToHA})$$
$$\Rightarrow (hcs : \textbf{emergency})$$
$$T_{\text{hcs}} = [med, arm, br]$$

$$r_{\text{arm}}^1 : \rightarrow (arm : \textbf{lyingOnFloor})$$

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You can download the demo and test it yourself from

https://github.com/securityandtrust/ruleml13

We would really appreciate your feedback!!!

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